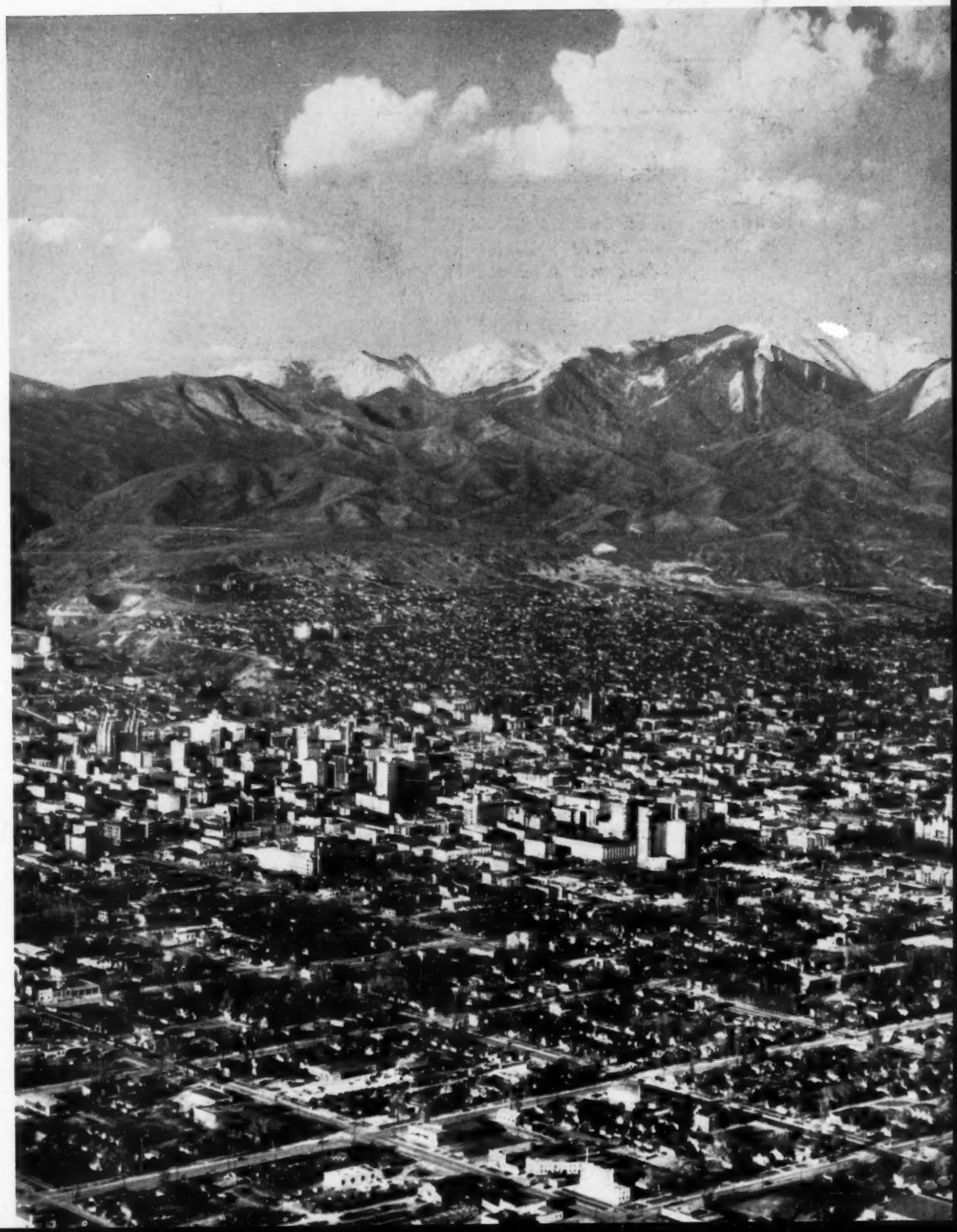
Journal of

FORESTRY

September 1958

Annual Meeting

Salt Lake City



SOCIETY OF AMERICAN FORESTERS 1900

Volume 56
Number 9

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VOLUME 56 ● NUMBER 9 SEPTEMBER 1958

Journal of Forestry

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NEW! Four-toothed Gyrodozer speeds clearing of stones, boulders, brush and trees!

HERE'S a revolutionary new concept in 'dozers—the steel-toothed Cat No. 7G Bulldozer. Developed by Caterpillar for faster production in tough going, the new Gyrodozer is proving its worth on job after job. This one, matched with a D7 Tractor, is doing clean-up work in the Cascade mountains in Washington. Bulldozing and ripping, it handles the job far faster than the 'dozer previously used for similar clearing.

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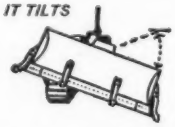
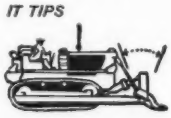


IT TIPS



While the Gyrodozer's blade is like that of the Cat No. 7S Bulldozer, it has four heat-treated steel teeth spaced along the moldboard. They project 23" forward from the 'dozer cutting edge. Maximum tilt of the blade is 3' to either side. Blade may be tipped through an arc of 16½°. Tip and tilt movements are easily controlled. The operator never has to leave his seat to make a blade adjustment. The Gyrodozer is 'dozer and ripper in one!

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Journal of Forestry

Official Organ of the Society of American Foresters

Annual Meeting

Society of American Foresters
Salt Lake City, Utah, September 29 - October 2, 1958

"Multiple-Use Forestry in the Changing West" is the theme of the 58th annual meeting, scheduled for Salt Lake City, September 29-30 and October 1-2.

Co-chairmen Floyd Iverson and Reed W. Bailey report that preparations have been made for one of the most interesting meetings of foresters ever sponsored by the Society. An attendance of one thousand is expected.

The meeting will be formally opened by President George A. Garratt at 9:30 a.m., Monday, September 29. George V. Hjort, past chairman of the Intermountain Section, the host Section, will be chairman of the first general session.

There will then follow the Society Affairs session, nine subject Division meetings, the annual dinner, and an all-day field trip.

Henry J. Malsberger, vice president of the Society, will preside as toastmaster at the Society's dinner on October 1, at which President Garratt will make two noteworthy awards. The Sir William Schlich memorial medal for distinguished service to forestry will be presented to an eminent American forester. Also to be presented will be the award for achievement in biological research leading to the advancement of forestry.

The featured speaker at the dinner will be Dr. Tom Gill, executive director of the Charles Lathrop Pack Forestry Foundation and Schlich medalist in 1954.

Ladies are welcome and invited. Special programs are being planned for them. Among their activities will be tours to the world famous copper mine at Bingham, Great Salt Lake, and the Alta winter sports area in the Wasatch Mountains.

GEORGE A. GARRATT

The Field Trip

A field trip, for men only, will be made on Thursday, October 2 to the Davis County Experimental Watershed to inspect the watershed activities of the U.S. Forest Service and to see aerial forest fire fighting tactics. Travel will be by open trucks over 40 miles of mountain road into high country unsurpassed for geologic, historic, and scenic features. No private passenger automobiles will be permitted, in the interest of safety.

A box lunch with hot and cold beverages will be served. Clothing for cool mountain weather will be desirable.

The cost of the trip will be about $2.50.

Those desiring to take this trip will be required to register for it in advance. Note the hotel reservation form on page 684.

Schedule of Events

Saturday, September 27

Council of Forestry School Executives; morning and afternoon.

Sunday, September 28

SAF Council; morning and afternoon.

Editorial Board, JOURNAL OF FORESTRY; evening.

Association of Consulting Foresters, open meeting; evening. (Program page 630.)

Monday, September 29

Opening General Session; morning.

Society Affairs Session; afternoon.

Division of Education; evening.

Division of Forest Products; evening.

Division of Watershed Management; evening.

Tuesday, September 30

Division of Forest Management; morning and afternoon.

Division of Forest Recreation; evening.

Division of Forest Economics and Policy; evening.

Division of Forest-Wildlife Management; evening.

Wednesday, October 1

Division of Silviculture; morning and afternoon.

Division of Range Management; morning and afternoon.

Society Dinner; evening.

Thursday, October 2

Field Trip to Wasatch Watershed Management areas; morning and afternoon; men only.

Ladies' Scenic Tour; morning and afternoon.

General Meeting

Monday morning, September 29

George V. Hjort, Chairman

1. Welcome by the President, George A. Garratt.

2. "Management Planning for Future Multiple-Use Forestry on Western National Forests." Donald E. Clark, U. S. Forest Service, Denver, Colo.

3. "Our National Parks in the Dynamic Challenge of Outdoor Recreation." Lemuel A. Garrison, National Park Service, Yellowstone Park, Wyo.

4. "Our Citizens Among Our Trees." Fred J. Sandoz, Booth-Kelly Lumber Company, Springfield, Ore.

Society Affairs Session

Monday afternoon, September 29

George A. Garratt, President
Henry J. Malsberger, Vice President
Henry Clepper, Executive Secretary

1. Report of the President.

2. Report of the Executive Secretary.

3. Report of the Editor of Society Publications. Arthur B. Meyer.

4. Report of the Director of the Study of Education in Forestry and Related Fields of Natural Resources Management. Harold G. Wilm.

5. Report of the Editor of *Forest Science*. Stephen H. Spurr.

6. Report of the Committee on International Relations. V. L. Harper.

7. Report of the Council Committee on Membership. Henry J. Vaux.

8. Report of the Committee for the Advancement of Forestry Education. Harold G. Wilm.

Policy Issues

William D. Hagenstein, Moderator

Panel Discussion of Wilderness Preservation.

Panel Discussion of Aerial Spraying of Woodlands.

Division of Education

Monday evening, September 29

A. Bigler Crow, Chairman
Peter W. Fletcher, Vice Chairman
William C. Bramble, Secretary

Symposium: "Is a Summer Camp Necessary in Forestry Instruction?"

1. "The Facts About Present Summer Camp Requirements and Instruction." Paul Y. Burns, School of Forestry, Louisiana State University, Baton Rouge, La.

2. "This is the Way *We* Do It, and Why."

HENRY J. MALSBERGER

John W. Barrett, College of Forestry, State University of New York, Syracuse, N. Y.

Richard J. Preston, School of Forestry, North Carolina State College, Raleigh, N.C.

Robert N. Colwell, School of Forestry, University of California, Berkeley, Calif.

3. "We Don't Require a Summer Camp Because . . ." W. F. McCulloch, School of Forestry, Oregon State College, Corvallis, Ore.

4. Discussion. Moderator, William C. Bramble, Department of Forestry and Conservation, Purdue University, Lafayette, Ind.

5. Business session and election of officers.

Division of Forest Products

Monday evening, September 29

Harry E. Troxell, Chairman
Bernard M. Granum, Vice Chairman
Rudolph Grah, Secretary

1. "Logging Methods in High-Altitude Forests of the Central Rocky Mountains." Francis R. Herman, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

2. "Logging in Recreational Areas." Ralph D. Hodges, Jr., Big Bear Timber Company, Redlands, Calif.

3. "Automated Sawmills — The Answer to the Small Log Problem." Milton H. Mater, Mater Machine Works, Inc., Corvallis, Ore.

4. "Putting the Handicapped Species to Work." Edward S. Kotok, Intermountain Forest and Range Experiment Station, Ogden, Utah.

5. "The Manufacture of Flapreg from Residue Wood." John W. Talbott, Department of Forestry and Range Management, State College of Washington, Pullman, Wash.

Division of Watershed Management

Monday evening, September 29

Peter W. Fletcher, Chairman
Sidney Weitzman, Vice Chairman
Jack S. Rothacher, Secretary

1. "Watershed Management Problems of the Intermountain West." George W. Craddock, Intermountain Forest and Range Experiment Station, Ogden, Utah.

2. "The Forest Service Soil and Water Management Program in the Intermountain Region." L. K. Clark and Edward L. Noble, U. S. Forest Service, Ogden, Utah.

3. "Getting a Watershed Management Program Started on a Municipal Watershed — The Experience of the City of Meridian, Mississippi." Arthur W. Nelson, Jr., Champion Paper and Fibre Company, Hamilton, Ohio.

4. "From Forest Influences to Applied Watershed Management in Southern California." Walter S. Hopkins, California Forest and Range Experiment Station, Berkeley, Calif.

5. "The Beaver Creek Project — A Pilot Test of Watershed Management." Earl F. Aldon, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

6. "Rainfall and Streamflow Relationships, Salt River System, Arizona." Lowell R. Rich, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

7. "Use of a Nuclear Soil Moisture Meter in Evapo-transpiration Studies on Mountain Soils." Richard B. Marston, Intermountain Forest and Range Experiment Station, Ogden, Utah.

8. "The Fool Creek Watershed Study—A Progress Report." Bertram C. Goodell, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

9. "Snow in Forest Openings and Forest Stands." H. W. Anderson, Raymond M. Rice, and Allan J. West, California Forest and Range Experiment Station, Berkeley, Calif.

10. "Interception of Rainfall Under Nine Densities of Pole-size Ponderosa Pine." Earl F. Aldon and Willie R. Curtis, Rocky Mountain Forest and Range Experiment Station, Flagstaff, Ariz.

11. Business meeting.

Division of Forest Management

Tuesday morning, September 30

Walter F. McCulloch, Chairman
Russell K. LeBarron, Vice Chairman
Raymond R. Moore, Secretary
Russell K. LeBarron, Session Chairman

1. "Pest Action Councils, Their Objectives and Accomplishments." E. L. Kolbe, Western Pine Association, Portland, Ore.

2. "Forest Insect Pest Surveys, Their Status and Needs." J. W. Bongberg, U. S. Forest Service, Washington, D.C.

3. "Animal Pest Problems and What Needs to be Done About Them." R. D. Moody, International Paper Company, Mobile, Ala.

4. "Where Do We Stand Now on Disease Control?" R. O. Cornelius, Weyerhaeuser Timber Company, Tacoma, Wash.

5. "The Forest Pest Situation in the Intermountain Area." D. E. Parker, U. S. Forest Service, Ogden, Utah.

6. Business session.

Tuesday afternoon, September 30

James L. Mielke, Session Chairman

1. "Logging — The Key to Forest Management." Steele Barnett, Boise Cascade Corporation, U. S. Forest Service, Boise, Idaho.

2. "Recent Trends in Management of Rocky Mountain Lodgepole Pine." David Tackle, U. S. Forest Service, Missoula, Mont.

3. "Forest Management Problems in the Engelmann Spruce-Subalpine Fir Forest Type." A. L. Roe, U.S. Forest Service, Missoula, Mont.

4. "Aspen Management in Utah." Joel L. Frykman, U.S. Forest Service, Ogden, Utah.

5. "Forest Diseases in Multiple-Use Management." J. W. Kimmey, U. S. Forest Service, Ogden, Utah.

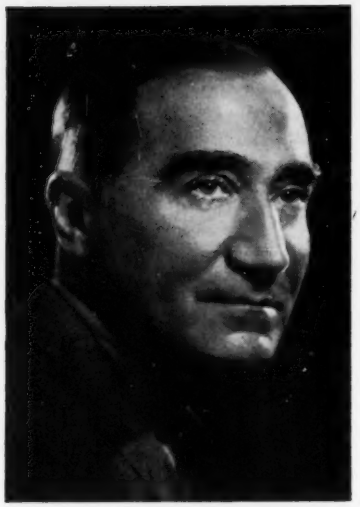
6. "Management Problems in the Juniper-Pinyon Type." J. Whitney Floyd, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

Division of Forest Economics and Policy

Tuesday evening, September 30

S. Blair Hutchinson, Chairman
John A. Zivnuska, Vice Chairman
Robert Keniston, Secretary

Symposium: "Measuring the Importance of Watersheds in our Future Economy."



TOM GILL

1. H. R. Josephson and Ellis T. Williams, Division of Forest Economics, U.S. Forest Service, Washington, D.C.

2. Roy E. Huffman, Division of Agriculture, Montana State College, Bozeman, Mont.

3. E. I. Kotok, Branch of Research, U. S. Forest Service (retired), Walnut Creek, Calif.

Division of Forest Recreation

Tuesday evening, September 30

F. C. Koziol, Chairman
F. W. Childs, Vice Chairman
William A. Parr, Secretary

1. "How Much Land for Forest Recreation?" Moderator: J. Whitney Floyd, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

Panel: Henry A. Harrison, Division of Land Use and Recreation, U. S. Forest Service, Washington, D. C.

James Tyndall, Cook County Forest Preserve, Chicago, Ill.

James P. Gilligan, Extension Service, University of California, Berkeley, Calif.

Chester J. Olsen, Utah Parks and Recreation Commission, Ogden, Utah.

2. "The Case for Wilderness Preservation Legislation." Howard Zahniser, The Wilderness Society, Washington, D. C.

3. "The National Outdoor Recreation Resources Review Objectives." Kenneth B. Pomeroy, The American Forestry Association, Washington, D. C.

4. "Public Recreation and Industrial Forestry." Frederick Billings, Weyerhaeuser Timber Company, Cosmopolis, Wash.

Division of Forest-Wildlife Management

Tuesday evening, September 30

William L. Webb, Chairman
Elbert H. Reid, Vice Chairman
Odell Julander, Secretary

1. "Seasonal Progression in the Chemical Content of Five Browse Species on Colorado Deer Range." Donald R. Dietz, Robert H. Udall, Harold R. Shepherd, and Lee E. Yeager, Colorado Cooperative Wildlife Research Unit, Fort Collins, Colo.

2. "Effects of Fire on Alaskan Wildlife." John L. Buckley, Alaska Cooperative Wildlife Research Unit, College, Alaska.

3. "Conflicts and Integration in the Management of Forests and Deer." Lowell Adams, Susanville Research Center, Susanville, Calif.

4. "Current Status and Needs for Wildlife Habitat Research in the South." Lowell K. Halls and Robert Blair, U. S. Forest Service, Southern Forest Experiment Station, New Orleans, La.

5. "Relationship of Blue Grouse to Vegetation Type in Colorado." Harold W. Steinhoff, Department of Forest Recreation and Wildlife Conservation, Colorado State University, Fort Collins, Colo.

6. "Deer Enclosure Studies in Longleaf Pine." Phil D. Goodrum, Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Nacogdoches, Tex.

Division of Silviculture

Wednesday morning, October 1

James D. Curtis, Chairman
William H. Cummings, Vice Chairman
Richard D. Roseberry, Secretary

1. "Chemistry in the Service of Silviculture." Nicholas T. Mirov, California Forest and Range Experiment Station, Berkeley, Calif.

2. "Individual Tree and Stand Evaluation from Increment Cores." Robert M. Echols, Southern Institute of Forest Genetics, Southern Forest Experiment Station, Gulfport, Miss.

3. "Contribution to a Better Understanding of the Process of Natural Reproduction in California." Dietrich Muelder, School of Forestry, University of California, Berkeley, Calif.

4. "Effect of Low Competition on Longleaf Pine Seedling Growth." David Bruce, Southern Forest Experiment Station, New Orleans, La.

5. "Seasonal Periodicity in Root Regeneration on Ponderosa Pine Transplants — A Physiological Condition." Edward C. Stone, School of Forestry, University of California, and Gilbert H. Schubert, California Forest and Range Experiment Station, Berkeley, Calif.

6. "Basic Concepts of Hardwood Silviculture." Leon S. Minckler, Central States Forest Experiment Station, Carbondale, Ill.

7. "Growth and Development of Red Alder Compared with Conifer in 30-Year-Old Stands." Carl M. Berntsen, Pacific Northwest Forest and Range Experiment Station, Corvallis, Ore.

Wednesday afternoon, October 1

1. Business meeting and election of officers.

2. Report of the Committee on Natural Areas. John F. Shanklin, U. S. Department of Interior, Washington, D.C.

3. Report of the Committee on Tree Improvement. Bruce J. Zobel, School of Forestry, North Carolina State College, Raleigh, N.C.

4. "Thinning a Young Stand of Lodgepole Pine." Theodore W. Daniel, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah, and G. H. Barnes, Oregon State College, Corvallis, Ore.

5. "Tree Root Mapping with Radioactive Tracers." George R. Staebler and John H. Rediske, Weyerhaeuser Timber Company, Centralia, Wash.

6. "The Site Quality of Ponderosa Pine and Douglas-Fir as a Function of Edaphic, Climatic, and Topographic Factors in the Coast Ranges of Northern California." Paul J. Zinke, School of Forestry, University of California, Berkeley, Calif.

7. "Commercial Small-Tree Utilization in an Uneven-Aged, Mixed Conifer Forest in California." Ray D. Berridge and Ted W. Nelson, Diamond Gardner Corporation, Lyman Springs, Calif.

8. Panel Discussion: "Chemicals in Silviculture."

Moderator, Theodore W. Daniel, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

"Herbicides." Harold R. Offord, California Forest and Range Experiment Station, Berkeley, Calif.

"Fertilizers." Stanley P. Gessel, College of Forestry, University of Washington, Seattle, Wash.

"Systemics." John H. Rediske, Weyerhaeuser Timber Company, Centralia, Wash.

"Poisons and Repellents." D. A. Spencer, Wildlife Research Laboratory, Denver, Colo.

Division of Range Management

Wednesday morning, October 1

Elbert H. Reid, Chairman
Grant A. Harris, Vice Chairman
Joe A. Wagner, Secretary

Theme: "Grazing in Multiple Use of Forest and Range Lands."

1. "The Influence of Domestic Livestock Grazing in Multiple-Use Land Management." William D. Hurst, U. S. Forest Service, Ogden, Utah.

2. "Consider the Effect and Place of Game Animals on Western Ranges." Arthur D. Smith, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

3. "Coordination of Cattle Grazing and Timber Growing on Southern Forests." Lowell K. Halls, Southern Forest Experiment Station, New Orleans, La.

4. "Multiple-Use Problems Encountered Under Forest Management on the Navajo Indian Reservation." Reino R. Sarlin, Bureau of Indian Affairs, Window Rock, Ariz.

5. "Rangeland Watershed Management." L. D. Love, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

Wednesday afternoon, October 1

Theme: "Manipulation of Range Vegetation."

1. Business meeting.

2. "Chemical Reduction of Hardwood Brush as a Range Improvement Practice in the South." Hurlon C. Ray, Soil Conservation Service, Fayetteville, Ark.

3. "Controlled Burning Responsibilities of the Forest Service in California." R. M. DeNio, U. S. Forest Service, San Francisco, Calif.

4. "Controlling Juniper for Range Improvement in Utah." A. Perry Plummer, Intermountain Forest and Range Experiment Station, Ogden, Utah.

5. "Effects of Burning on Range and Forage Values in the Ponderosa Pine Forest." Harold Weaver, Bureau of Indian Affairs, Portland, Ore.

The Society Dinner

Wednesday evening, October 1

Henry J. Malsberger, Toastmaster

1. Presentation of the Sir William Schlich memorial medal by President Garratt.

2. Presentation of the Society of American Foresters award for achievement in biological research by President Garratt.

3. Address by Tom Gill, Charles Lathrop Pack Forestry Foundation, Washington, D.C.

4. Entertainment.

Association of Consulting Foresters

Sunday evening, September 28

Robert Moore, President
Seymour I. Somberg, Executive Secretary

Open Session

Panel discussion: "How Can We Achieve Better Management of Small Forest Properties?"

Edward C. Crafts, U. S. Forest Service, Washington, D. C.

J. Whitney Floyd, Department of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

Emanuel Fritz, Consulting Forester, Berkeley, Calif.

Edward Stuart, Consulting Forester, Hampton, Va.

Closed Session

A business meeting for Association members only will follow the open session.

Committees for the Meeting

The general co-chairmen for this meeting are Floyd Iverson, U. S. Forest Service, Ogden, Utah; and Reed W. Bailey, Intermountain Forest and Range Experiment Station, Ogden, Utah.

Chairman of the Program Committee is Lewis M. Turner, College of Forest, Range and Wildlife Management, Utah State University, Logan, Utah.

The chairman of the Committee on Arrangements is F. C. Koziol, U. S. Forest Service, Federal Building, Salt Lake City, Utah.

Hotel Reservations

Those expecting to attend the meeting are advised to arrive in Salt Lake City on Sunday, September 28, or not later than 9 a.m., on Monday, September 29. The first general session will start at 9:30 a.m., Monday, in the auditorium of the new Utah Hotel Motor Lodge convention center.

The Utah Hotel, facing Temple Square, will be the headquarters for the meeting. This hotel has 500 rooms, but it will not be able to accommodate all those in attendance, hence other ho-

tels are making space available, including the Utah Hotel's new Motor Lodge, also adjacent to Temple Square.

All requests for room reservations should be sent to the SAF Housing Committee, in care of the Convention Bureau of the Chamber of Commerce, P.O. Box 329, Salt Lake City 10, Utah. Second and third choices should be given.

Reservations will be accepted and confirmed in the order of their receipt. Assignment of rooms will be made at, or as near, the desired rate as possible. Early reservation requests are desirable.

The reservation coupon on page 684 may be used. However, readers who do not want to cut the coupon from their JOURNALS may request reservations by letter, provided all the information listed on the coupon is given.

Hotels

All rates quoted are with bath; these are daily rates.

Utah Hotel, South Temple and Main Streets; 500 rooms; garage attached. Single occupancy: $8, $9, $10, $11, $12, $13, $14. Double-bed rooms: $10, $11, $13, $14, $15, $16, $17. Twin-bed rooms: $11, $12, $13, $15, $16. Suites (sitting room, bedroom, and bath): single occupancy, $18 and up; double occupancy, $20 and up.

Utah Hotel Motor Lodge, West Temple Street facing Temple Square; 100 units; parking facilities. Single occupancy: $8 to $14. Double-bed rooms: $10 to $17. Twin-bed rooms: $12 to $17.

A rollaway bed may be brought in for an additional adult either at the Utah Hotel or Motor Lodge, the charge for which is $2 daily.

Temple Square Hotel, 75 West Temple and South Temple Streets, facing Temple Square; 188 rooms. Single occupancy: $5 to $7.50. Double-bed rooms: $7 to $9. Twin-bed rooms: $9 to $11. Rooms with three beds: $11 to $13.

Newhouse Hotel, Main at 4th South Streets; 400 rooms; adjacent garage; four blocks from Utah Hotel. Single occupancy: $6.50 to $9. Double-bed rooms: $8.50 to $12. Twin-bed rooms: $9 to $13. Suites: $20 to $32.

There are other hotels in Salt Lake City. The Convention Bureau will make reservations at hotels other than those listed above if members desire lower rates.

Motels and Motor Lodges

Salt Lake City has more than 30 motels. A complete list of them, together with their address and daily rates may be obtained on application to the Convention Bureau, P.O. Box 329, Salt Lake City 10, Utah.

In requesting a reservation at a motel, payment equal to the daily rate but in no case less than $6 should accompany the reservation request.

The following six motels are listed as they are less than six blocks from the Utah Hotel.

Brewster's Seagull Motel, 325 North 2nd Street West; $6.50 to $8.50.

City Center Motel, 134 West North Temple Street; $7.50 to $12.

Covered Wagon Motel, 230 West North Temple Street; $6 to $13.50.

Covey's New American Motel, 522 South Main Street; $6 to $12.

Deseret Inn Motor Hotel, 50 West 5th South Street; $8 to $18.

Western Motor Lodge, 323 West North Temple Street; $7 to $11.

THIS SCENE on the Santaquin Watershed in the Uinta National Forest, Utah, shows the effects of contour trenching to restore vegetation. *Left*, the land before trenching; *right*, the same location after trenching.

Guide Map to Points of Interest to Foresters in the Rocky Mountain Area

(See Map on Following Pages)

Committee's note.—It is impossible to describe all of the scenic and forestry attractions to be found in the "Scenic West." Almost every road that penetrates the Rocky Mountain area will have an appeal to the out-of-state visitor. Every type of recreational facility is available within this area with the exception of the seashore.

Forest and wildland use varies from deserts with little use to primarily range, wildlife and watershed use in some of the southern and eastern portions of the Rocky Mountain area to major timber types of ponderosa pine, Douglas-fir and larch, lodgepole pine, white pine, spruce, aspen and pinyon pine-juniper. The traveler can traverse the area seeing vast areas of sagebrush plains, rich irrigated valleys and up thrusting mountains and see little timber. Yet within those mountains or on the high plateaus lie great acreages of commercial timberland.

During the latter part of September and early October will be an ideal time to visit the Rocky Mountain West. Days will usually be warm and clear and the nights cool.

POINTS OF INTEREST COMMITTEE
Joel L. Frykman, Chairman
Charles A. Wellner
John Wikstrom
William S. Rozynek

Arizona

1. **Monument Valley.** Features giant columns of stone, remnants of an eroded plateau. Located at the north edge of the Navajo Reservation, it is very remote and the roads are poor, but it is a worthwhile trip.
2. **Navajo and Hopi Indian Reservations.** Visit the world of the Navajo and Hopi. Both can be reached by a good road from Gallup, N. Mex. to Cameron, Ariz. October is a good period of the year for visiting this area. Contact Indian Service for detailed information.
3. **Canyon de Chelly National Monument.** Located within the eastern half of the Navajo Reservation, it contains sheer red sandstone walls pierced by many arched caves and cliff dwellings. It is a miniature Grand Canyon.
4. **Grand Canyon National Park.** The South Rim with entrance road near Williams or Cameron is open the year around. The North Rim is open until winter snows close State Highway 67 or U. S. 89. The roads will be open during the convention. The entrance to the North Rim is by way of the spectacular Navajo bridge crossing of the Colorado on U. S. 89 and Jacobs Lake on the Kaibab Plateau.
5. **Headquarters of the Kaibab National Forest.** Williams.
6. **Headquarters of the Coconino National Forest.** Flagstaff. Flagstaff is also the headquarters of a research center for timber and range management research. Its industries include ponderosa pine logging and sawmilling and a small pulpmill. A larger pulpmill is proposed based on a sale of 6,000,000 cords of timber.
7. **Beaver Creek Watershed Project.** Located at Beaver Creek Ranger Station 18 miles south of Sedona, this 276,000 acre watershed is used to study water availability under various vegetative types and practices.
8. **Headquarters of the Sitgreave National Forest.** Holbrook.
9. **Petrified Forest National Monument and the Painted Desert.**
10. **Headquarters of the Apache National Forest.** Springerville.
11. **Alpine. Big Lake, McNary, Show Low.** Can be reached by U. S. Highways 60 and 260 and State Highway 73 near Springerville. Points noted for beautiful commercial forest lands and good fishing.
12. **Headquarters of the Prescott National Forest.** Prescott.
13. **Headquarters of the Tonto National Forest.** Phoenix.
14. **Tempe.** A field headquarters for range and watershed management research. Offices are located at Room 107, Agricultural Building, Arizona State College.
15. **Roosevelt-Saguaro Chain of Lakes.** A spectacular example of recreation and irrigation development of a basically sparse water supply.
16. **Sierra Ancha Experimental Forest.** A major study area for watershed and forestry research in the Southwest, this large watershed is under treatment for water availability under various vegetative types and management practices. Arrange for tours by writing to the Rocky Mountain Forest and Range Experiment Station, Room 107, Agriculture Building, Arizona State College, Tempe.
17. **Boothill Cemetary.** Tombstone. Legendary in the history of the early American West.
18. **Saguaro National Monument.** Famous for many fine specimens of the towering saguaro cactus. Located just east of Tucson.
19. **Headquarters of the Coronado National Forest.** Tucson. Also field headquarters for a timber and range management research unit.

Colorado

1. **Dinosaur National Monument.** Features narrow, deep canyons fashioned by the Green and Yampa Rivers. Several skeletons of dinosaurs are displayed in natural relief settings. It was the proposed site of the controversial Echo Park Dam.
2. **Headquarters of the Routt National Forest.** Steamboat Springs.
3. **Headquarters of the Rocky Mountain Forest and Range Experiment Station and Roosevelt National Forest.** Ft. Collins. The site of the Colorado State University College of Forestry and Range Management.
4. **Rocky Mountain National Park.** Located northwest of Denver, the Rocky Mountain National Park embraces 405 square miles of spectacular mountain scenery. This park contains 42 massive peaks, including 14,255-foot Longs Peak. This is one of the most popular parks in the United States and the most accessible.
5. **Fraser Experimental Forest.** Features basic research to evaluate effect of timber cut on water yield and quality. Two watersheds of similar character have been selected with various types of timber harvest applied to one drainage. A second drainage is maintained as a control. Experimental forest headquarters are located approximately 12 miles southwest from Fraser. Overnight accommodations are available at Fraser or Granby.
6. **Rocky Mountain Region of the U. S. Forest Service.** Denver. The headquarters is located at the Federal Center.
7. **Headquarters of the Arapaho National Forest.** Idaho Springs.
8. **Mount Evans.** Located 56 miles west of Denver this 14,260-foot high peak may be reached via the world's highest auto road.
9. **Headquarters of White River National Forest.** Glenwood Springs.
10. **Colorado National Monument.** A high-walled mesa of red and white sandstone overlooking the Colorado River.
11. **Research Center Headquarters.** Grand Junction. A branch of the Rocky Mountain Forest and Range Experiment Station where range and watershed management research is being conducted.
12. **Grand Mesa.** A two-mile high tableland; the largest flat-topped mountain in the United States.
13. **Forest Tree Nursery.** Monument. Operated by the U. S. Forest Service.
14. **Headquarters of the Pike National Forest.** Colorado Springs.
15. **Pikes Peak.** Commanding a majestic view of the Rockies and the eastern plains, this peak can be reached by the winding Pikes Peak Highway or a spectacular cog railway.

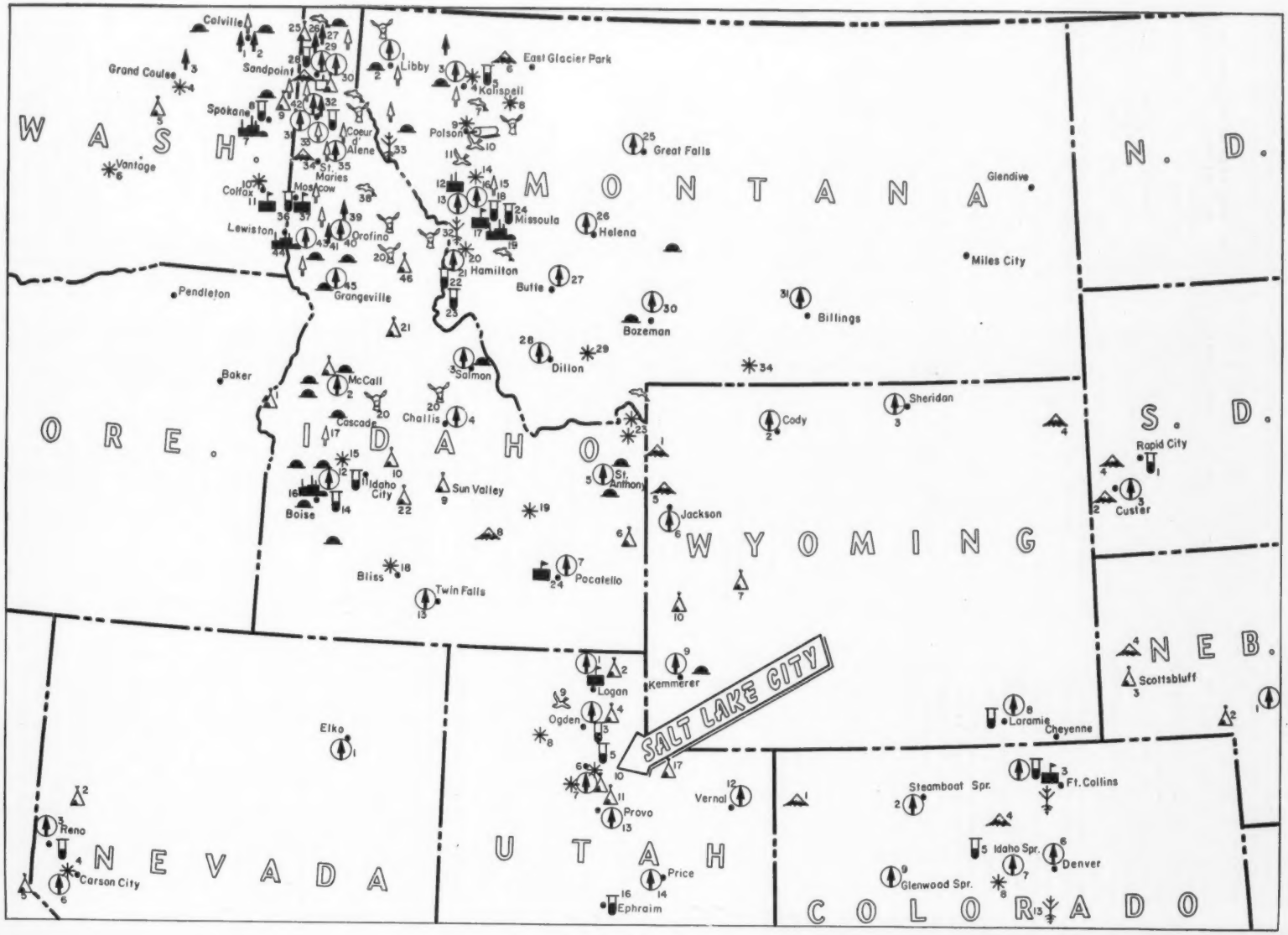
16. **Headquarters of the Uncompahgre National Forest.** Delta.
17. **Black Canyon.** Located in the Gunnison National Monument, it embraces a 10-mile strip of 50-mile canyon cut through granite by the Gunnison River.
18. **Headquarters of the Gunnison National Forest.** Gunnison.
19. **Headquarters of the San Isabel National Forest.** Pueblo.
20. **Great Sand Dunes National Monument.** Located just west of the Sangre de Cristo Mountains, it includes 46,000 acres of vari-colored sands that lie in ever-shifting waves and rolls in the San Luis Valley.
21. **Headquarters of the Rio Grande National Forest.** Monte Vista.
22. **Headquarters of the San Juan National Forest.** Durango.
23. **Mesa Verde National Park.** Contains the largest and best preserved cliff dwellings in existence. Open the year around, it may be reached by a short road from U. S. Highway 160 in southwestern Colorado.

Visitors having special interests should request information from the Denver Travel Bureau, Denver, Colo. A Colorado Travel Guide is also available without cost from the United Travel Guide Company, 1950 Curtis Street, Denver, Colo.

Big game hunting starts in mid-October so members attending the convention will not be able to participate unless they delay their return.

Idaho

1. **Hell's Canyon.** The deepest gorge in the United States—almost 8,000 feet deep at one point, this canyon forms an almost impassable boundary between Idaho and Oregon for a distance of 100 miles. The Brownlee Dam being built near Cambridge, Idaho, by the Idaho Power Company and the proposed "skimmer" method of trapping and transporting fish around the dam are of interest.
2. **Headquarters of the Payette National Forest.** McCall. Located on Payette Lake with beautiful scenery, fishing, and boating, McCall is also the home of the Brown's Tie and Lumber Company which operates a sawmill on the shore of this lake. A Southern Idaho Timber Protective Association field headquarters is located in McCall.
3. **Headquarters of the Salmon National Forest.** Salmon. Boat trips are made down the Salmon River, "River of No Return," from below Shoup. The gorge trip traverses the Idaho Primitive Area. One of the few major salmon runs is made on the Salmon River.
4. **Headquarters of the Challis National Forest.** Challis.
5. **Headquarters of the Targhee National Forest.** St. Anthony. The Targhee National Forest contains some of the finest stands of lodgepole pine timber in the West.
6. **Swan Valley-Irwin Area on the Snake River.** The recently completed Palisades Reservoir will be developed as an outstanding scenic, recreational, and fishing attraction. Coordinated planning by the Bureau of Reclamation and the U. S. Forest Service.
7. **Headquarters of the Caribou National Forest.** Pocatello.
8. **Craters of the Moon National Monument.** Features old lava bed formations, volcanic craters, ice-lined lava caves, and symmetrical cinder cones giving it the pockmarked appearance of the surface of the moon.
9. **Ketchum.** Sun Valley Lodge and Challenger Inn, operated by the Union Pacific Railroad, serve an area of beautiful scenery in the heart of the Sawtooth Mountains. Ski lifts and an ice rink are operated the year around. Many tours can be arranged from this location.
10. **Redfish Lake-Stanley Basin.** The "Switzerland" of Idaho, a beautiful timbered valley with the serrated sawtooth range as a backdrop. It is a major entrance point to the Sawtooth Wilderness Area. Redfish, Alturas, Sawtooth, Stanley, and Bull Trout are some of the many fine fishing lakes in the area.
11. **Boise Experimental Forest.** Operated from the Boise Research Center by the Intermountain Forest and Range Experimental Station. Features studies in the management of ponderosa pine stands.
12. **Headquarters of the Boise National Forest.** Boise. The state capitol of Idaho, Boise is also the headquarters for the Idaho State Forester's office and the Southern Idaho Forestry Association.
13. **Headquarters of the Sawtooth National Forest.** Twin Falls.
14. **Boise Research Center.** Operated by the Intermountain Forest and Range Experiment Station. Research conducted in range, wildlife, and watershed management, and forest management and genetics.
15. **Town Creek Plantation** near Idaho City. A large experimental planting of ponderosa pine by Region Four, U. S. Forest Service, and the Intermountain Forest and Range Experiment Station. A five-year project—455 acres with 250,000 trees planted to date—second-year survival of as high as 98.94 percent. Contact district ranger, Idaho City, or forest supervisor, Boise National Forest, Boise.
16. **Industrial Area.** Boise and vicinity. Large bandsaw sawmills at Emmett, Horseshoe Bend, Council, Cascade, McCall, Tamarack, Meridian, Boise, and Mountain Home. The major tree species—ponderosa pine, Douglas-fir, lodgepole pine, spruce, and white fir.
17. **Boise Cascade Corporation Tree Farm.** One hundred and sixty thouand acres of ponderosa pine and Douglas-fir timberland. In this area is also the location of a Southern Idaho Timber Protective Association field headquarters.
18. **Thousand Springs.** Numerous springs flowing into the Snake River from beneath a great lava flow in the Snake River plains. Located on the Snake River between Bliss and Buhl, on U. S. Highway 30.
19. **Arco.** National Reactor Testing Laboratory operated by the Atomic Energy Commission. Not open to visitors.
20. **Idaho Elk Season.** Seasons vary from mid-September to December. Non-resident fee $50 for an elk or deer plus $25 for an animal of both species.
21. **Idaho Primitive Area.** 1,232,744 acres of semi-wilderness within the Boise, Payette, Challis, Salmon, and Nez Perce National Forests. Limited access after mid-October.
22. **Sawtooth Wilderness Area.** 200,942 acres of rough, rugged, and superb mountain scenery with numerous lakes and many miles of fishing streams. Limited access after mid-October.
23. **Targhee-Gallatin Pulpwood Cuttings.** Lodgepole pine pulpwood cut on Targhee and Gallatin National Forests is shipped to Wisconsin pulpmills. Cutting may be seen from U. S. Highways 20 and 191.
24. **Idaho State College.** Pocatello. This school gives instruction in forestry for the first two years in college.
25. **"Panhandle" Recreational Areas.** Priest, Pend Oreille, Spirit, Twin, Hayden, and Coeur d'Alene Lakes are some of the finest recreation lakes to be found in the West. Swimming, boating, fishing, camping, riding, hiking are featured.
26. **Priest Lake Timber Protective Association.** Coolin.
27. **Priest Lake State Forest.** Coolin.
28. **Priest River Experimental Forest.** Maintained by the Intermountain Forest and Range Experiment Station near Priest Lake in northern Idaho. Established in 1911, it is a field center for research and demonstration in western white pine forest management. Also featured is work in fire control, disease control, and watershed management research. Arrangements for visits should be made with the Inland Empire Research Center, 157 South Howard Street, Spokane 4, Wash.
29. **Pend Oreille Timber Protective Association.** Sandpoint.
30. **Headquarters of the Kaniksu National Forest.** Sandpoint.
31. **State of Idaho Forestry Department North Idaho Headquarters.** Coeur d'Alene.
32. **Deception Creek Experimental Forest.** Situated in the western white pine forests 22 miles east of Coeur d'Alene, this experimental forest is maintained by the Intermountain Forest and Range Experiment Station for research and demonstration in protection and management of the western white pine type. Arrangements for visits should be made with the Inland Empire Research Center, 157 South Howard Street, Spokane 4, Wash.
33. **Western Pine Association Field Headquarters.** Coeur d'Alene.
34. **Heyburn State Park.** St. Maries. A beautiful park of lake, mountains and timber. Included in the park area are most of the forest trees of Idaho. Swimming, boating, hiking, and fishing are excellent.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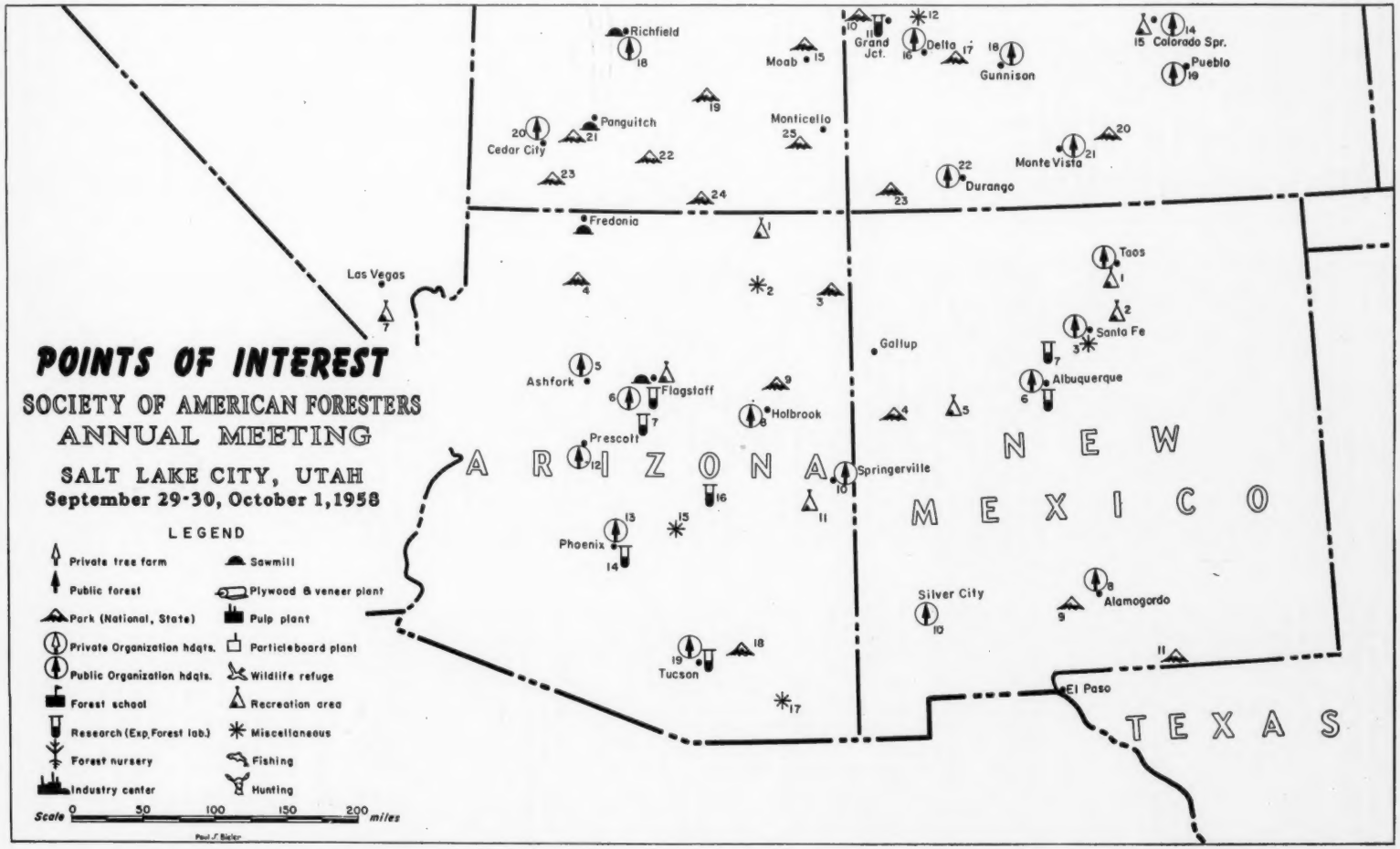
Colville
Grand Coulee
Sandpoint
Libby
East Glacier Park
Kalispell
Spokane
Coeur d'Alene
Polson
Great Falls
Vantage
St. Maries
Glendive
Colfax
Moscow
Lewiston
Orofino
Missoula
Helena
Miles City
Pendleton
Grangeville
Hamilton
Butte
Billings
Bozeman
Baker
McCall
Salmon
Dillon
Sheridan
Cascade
Challis
Cody
Rapid City
Idaho City
Sun Valley
St. Anthony
Custer
Boise
Jackson
Bliss
Twin Falls
Pocatello
Kemmerer
Scottsbluff
Logan
Ogden
SALT LAKE CITY
Laramie
Cheyenne
Elko
Steamboat Spr.
Ft. Collins
Vernal
Provo
Reno
Idaho Spr.
Denver
Carson City
Price
Glenwood Spr.
Ephraim


POINTS OF INTEREST
SOCIETY OF AMERICAN FORESTERS
ANNUAL MEETING
SALT LAKE CITY, UTAH
September 29-30, October 1, 1958
LEGEND
Private tree farm
Public forest
Park (National, State)
Private Organization hdqts.
Public Organization hdqts.
Forest school
Research (Exp. Forest lab.)
Forest nursery
Industry center
Sawmill
Plywood & veneer plant
Pulp plant
Particleboard plant
Wildlife refuge
Recreation area
Miscellaneous
Fishing
Hunting
Scale 0 50 100 150 200 miles
Paul J. Bieler
Richfield
Moab
Grand Jct.
Delta
Gunnison
Colorado Spr.
Pueblo
Panguitch
Cedar City
Monticello
Monte Vista
Durango
Fredonia
Las Vegas
Taos
Santa Fe
Gallup
Albuquerque
Ashfork
Flagstaff
Holbrook
Prescott
Springerville
Phoenix
Silver City
Alamogordo
Tucson
El Paso
ARIZONA
NEW MEXICO
TEXAS

35. **Headquarters of the St. Joe National Forest.** St. Maries.
36. **North Idaho Forest Genetics Center.** Moscow. Recently established by the U. S. Forest Service and the University of Idaho for research in the development of better forest trees. The current program is concerned with breeding a blister rust resistant white pine of superior growth and form. Arrangements to visit the center should be made through the Inland Empire Research Center, 157 South Howard Street, Spokane 4, Wash.
37. **University of Idaho College of Forestry.** Located at Moscow, the college includes facilities for teaching and research. The college has an experimental forest on nearby Moscow Mountain and also operates a tree nursery.
38. **Fishing Opportunities.** Opportunities for mountain, lake, and stream recreation are excellent in the north Idaho panhandle. A five-day license can be obtained for $4.
39. **Clearwater State Forest.**
40. **Headquarters of the Clearwater National Forest.** Orofino.
41. **Potlatch and Clearwater Timber Protective Associations.** Orofino.
42. **Headquarters of the Coeur d'Alene National Forest.** Coeur d'Alene.
43. **North Idaho Indian Agency.** Lapwai.
44. **Potlatch Forest Industries.** A completely integrated wood using industry built around the "largest white pine sawmill in the world." In addition to lumber the company produces plywood, presto-logs, pulp, and paper at Lewiston. Visitors are welcome for guided tours through this interesting mill. Clearwater River is still used by the company to drive logs in the spring and summer. Log decks can be seen on a trip into this colorful country.
45. **Headquarters of the Nez Perce National Forest.** Grangeville.
46. **The Selway-Bitterroot Wilderness Area.** Includes most of the drainages of the Lochsa and Selway Rivers and provides excellent opportunities for forays in the "unspoiled" wilderness of northern Idaho. Packers are available at various points around the periphery of the area and a good system of trails is maintained by the U. S. Forest Service. Area—1,872,295 acres.

Montana

1. **Headquarters of the Kootenai National Forest.** Libby.
2. **J. Neils Lumber Company.** Situated at Libby, in the scenic Kootenai country, this large, well integrated plant manufacturers lumber, poles, and other wood products.
3. **Headquarters of the Flathead National Forest.** Kalispell.
4. **Hungry Horse Dam.** Hungry Horse is the world's fourth highest and third largest engineered construction dam. The structure is 564 feet above bedrock and has a crest length of 2,115 feet. The South Fork of the Flathead River provides the water for the dam. This watershed is located primarily in the Bob Marshall Wilderness Area on the Flathead National Forest. The lake formed is 34 miles long and 3½ miles wide at the widest part. Energy produced at Hungry Horse is marketed by the Bonneville Power Administration. There are conducted tours through the dam during the summer and fall. Camping and picnicking facilities are available around the lake.
5. **Coram Experiment Forest.** Coram. Maintained by the Intermountain Forest and Range Experiment Station for research and demonstration in the silviculture and management of the western larch-Douglas-fir forest type. Arrangements for visits should be made with the Missoula Research Center, U. S. Forest Service. Missoula.
6. **Glacier National Park.** Here will be found some of the most spectacular mountain scenery of the whole Rocky Mountain range. The glaciers in the park are among the few in the United States which are easily accessible. Over 1,000 miles of excellent trails lead into the park lakes and streams where fishing is excellent. Campgrounds, hotels, motels, and chalets offer a convenient variety of facilities. The normal season is June 15 to September 15.
7. **Fishing Areas.** Montana abounds with good fishing lakes and streams. Out-of-state fishing licenses in Montana are $3 for a five-day license or $10 for the season.
8. **Bob Marshall Wilderness Area.** This large tract of rugged mountain area astride the Continental Divide south of Glacier National Park is famous for its rugged beauty, its rivers, lakes, good fishing, big game, and the "Chinese Wall."
9. **Flathead Lake and Flathead Valley.** One of the most beautiful combinations of mountain and valley scenery to be found anywhere in the Northwest. Rising to the east of the valley and lake are the rugged Mission Mountains containing some of the few remaining areas of natural grizzly bear habitat. The valley itself is primarily agricultural and ranching. Fruit orchards, seed potatoes, and some grain cover the productive, well-kept valley floor. Flathead Lake and Valley may be reached by auto from the northwest over U. S. Highway 2. U. S. Highway 93 skirts Flathead Lake on the west and traverses the length of the valley. Population centers include Kalispell and Whitefish on the north and Polson at the south end of the lake.
10. **Ninepipes Reservoir Bird Refuge.** Located in the beautiful Flathead Valley in the shadow of the rugged Mission Mountains, it is a haven for waterfowl of all kinds. The area is traversed by U. S. Highway 93.
11. **The National Bison Range.** Moiese. On this 19,000 acre refuge roams one of the largest remaining herds of American bison or buffalo. Established in 1908 by Congress at the request of Theodore Roosevelt, it is one of the oldest big game sanctuaries in the country. The area provides a natural habitat not only for the buffalo but for deer, elk, bighorn sheep, antelope, and longhorn cattle as well.
12. **Montana Waldorf Paper Company.** Missoula. A six million dollar plant recently completed for converting sawmill residue to paper pulp. This mill, located ten miles west of Missoula, is designed to utilize chips produced by mills in western Montana to manufacture noodle pulp. This mill is a significant development because it utilizes all the recent developments to minimize stream pollution.
13. **Headquarters of the Lolo National Forest.** Missoula.
14. **Smokejumper Center.** Missoula. Maintained by the U. S. Forest Service, this is the center for aerial fire control operations in the northern Rocky Mountains. Includes facilities for training, housing, and dispatching over a hundred smokejumpers as well as warehouse space for supplies and equipment used in fire control.
15. **Headquarters for the Northern Region, U. S. Forest Service.** Missoula.
16. **Montana State Forester's Headquarters.** Missoula.
17. **Montana State University.** Missoula. Visitors are welcome to visit this center of forestry education in Montana and to examine their equipment and facilities.
18. **Also at Missoula are the headquarters for following units of the Intermountain Forest and Range Experiment Station: Forest Fire Laboratory, Forest Insect Laboratory, and Missoula Research Center.**
19. **Missoula Timber Industries.** Missoula is a timber-using industry center. Sawmills, a pulp mill, plywood plant, and other wood processing plants may be visited here.
20. **Bitterroot Valley.** A valley of cattle ranching and rich agricultural land backed by the beautiful Bitterroot Mountains. This valley extends south from Missoula to the Idaho border. The Bitterroot Mountains which form the Montana-Idaho border in this area are famous for their rugged peaks and broad glaciated canyons. Hamilton is the main center of population and home of the famous Rocky Mountain Public Health Laboratory, known principally for the discovery of spotted fever vaccine. Fishing is excellent in the main Bitterroot River as well as the tributary streams. U. S. Highway 93 passes directly through the center of the Bitterroot Valley.
21. **Headquarters of the Bitterroot National Forest.** Hamilton.
22. **Lick Creek Experimental Area.** Includes one of the first timber sales made by the U. S. Forest Service in the ponderosa pine stands of western Montana. The tract contains a variety of tests of cutting and stand improvement methods. The area is maintained cooperatively by the Intermountain Forest

and Range Experiment Station and the Bitterroot National Forest.

23. **Piquette Creek Experimental Forest.** Maintained by the Intermountain Forest and Range Experiment Station for purposes of research and demonstration in the management of ponderosa pine forests. It is located near Darby and is easily reached by auto. Arrangements for visits should be made with the Missoula Research Center, U. S. Forest Service, Missoula.
24. **Lubrecht Experimental Forest.** Maintained by the School of Forestry, Montana State University, Missoula, for purposes of student training, demonstration. and research, this experimental area is located in second growth ponderosa pine and Douglas-fir forests in the Blackfoot Valley near Missoula.
25. **Headquarters of the Lewis & Clark National Forest.** Great Falls.
26. **Headquarters of the Helena National Forest.** Helena.
27. **Headquarters of the Deerlodge National Forest.** Butte.
28. **Headquarters of the Beaverhead National Forest.** Dillon.
29. **Virginia City.** Virginia City, located on Montana State Highway 34 between West Yellowstone and Butte, is an interesting, old ghost town that has been restored. This city was once the territorial capital of Montana and during gold rush days was a population center. The general stores, saloons, shops, stagecoaches, and board sidewalks have been restored in the style of the early days. Accommodations are available in or near Virginia City.
30. **Headquarters of the Gallatin National Forest.** Bozeman.
31. **Headquarters of the Custer National Forest.** Billings.
32. **State Nursery.** Missoula.
33. **Savenac Nursery.** U. S. Forest Service tree nursery located at Haugan.
34. **Famous Red Lodge-Cooke City Highway.** This highway passes through an area of unusual scenic splendor crossing the Beartooth Pass at elevation 10,940 feet. It serves as an eastern entrance to Yellowstone Park.

Nebraska

1. **Headquarters of the Nebraska National Forest.** Lincoln. A shelterbelt management research center is located here.
2. **Ash Hollow.** A historic point along the Oregon Trail, scene of a great battle between the Sioux Indians and 1200 American soldiers in the year 1855.
3. **Chimney Rock.** One of the famous landmarks along the Oregon Trail. It is visible from 30 miles away above the Nebraska plain.
4. **Scotts Bluff National Monument.** A great cliff that rises above the North Platte River southwest of Scotts Bluff.

Nevada

1. **Headquarters of the Humboldt National Forest.** Elko.
2. **Pyramid Lake.** The home for thousands of huge white pelicans and some of the largest trout known.
3. **Headquarters of the Toiyabe National Forest.** Reno. A research center for range and watershed management research is located here also.
4. **Virginia City.** A booming mining town during the Civil War, Virginia City was long abandoned. In recent years it has been opened up and developed for tourist trade.
5. **Lake Tahoe.** This lake lies between many of the most beautiful peaks of the High Sierras and is a favorite vacation spot. The 1960 Winter Olympics will be held near Lake Tahoe at Squaw Valley, Calif.
6. **Carson City.** State capital and headquarters for the Nevada state forester.
7. **Hoover Dam.** This dam is the highest in the world, forming a great man-made lake, Lake Mead. Conducted tours are made each day. Boat trips can be made on Lake Mead and fishing is excellent.

New Mexico

1. **Headquarters of the Carson National Forest.** Taos. One of the most picturesque of all pueblos and scene of the famous Corn Dances. High country, Eagle Nest Lake area, Moreno Valley, and Red River Canyon nearby.
2. **Pecos Wilderness Area.** Located 20 miles north of Pecos in beautiful alpine country. Area—165,000 acres. Horses available at Cowles.
3. **Headquarters of the Santa Fe National Forest.** Santa Fe. Santa Fe is a city with many historical and cultural attractions.
4. **El Morro National Monument.** A huge sandstone mesa covered with messages carved by Indians and early Spanish explorers.
5. **Acoma Pueblo.** This fortified village atop Acoma Rock is one of the more interesting of the many pueblos in New Mexico.
6. **Headquarters of the Southwestern Region of the Forest Service.** Albuquerque. Also headquarters of the Cibola National Forest, and a field station for research in timber and range management problems.
7. **Bernalillo Watershed Project.** Located in the foothills of the Sandia Mountains just east of Bernalillo, this project exhibits contour terracing to check flood threats.
8. **Headquarters of the Lincoln National Forest.** Alamogordo.
9. **White Sands National Monument.** The Monument contains little, if any, sand but it is part of the world's largest of rare gypsum deserts.
10. **Headquarters of the Gila National Forest.** Silver City.
11. **Carlsbad Caverns National Park.** This is an unrivaled underground cavern open to tour the year around. It is well worth an extra few miles of driving to enjoy this unusual attraction.

South Dakota

1. **Research Center.** Rapid City. Branch of Rocky Mountain Forest and Range Experiment Station featuring research in forest and range management and wood utilization.
2. **Wind Cave National Park.**
3. **Headquarters of the Black Hills National Forest.** Custer. Ponderosa pine forest on the eastern edge of the species' natural range. Contains the earliest timber sale made in the Forest Service.
4. **Mount Rushmore National Monument.** Outstanding sculptured faces of Washington, Jefferson, Lincoln, and Teddy Roosevelt by Borgholm. Open the year around.

The Black Hills of South Dakota. This uplift area located in the western portion of South Dakota and overlapping the eastern boundary of Wyoming contains many points of interest.

Most of the area is under the jurisdiction of the United States Forest Service and has been under intensive management for over fifty years. Recreational use is heavy because it is the principal forest area within the Great Plains.

Utah

1. **Headquarters of the Cache National Forest.** Logan. Also site of the Utah State University School of Forestry, Range and Wildlife Management.
2. **Logan Canyon.** An outstanding scenic drive with colorful aspen and maple trees in autumn foliage. Features numerous well developed picnic areas, Logan Cave, and beautiful canyon scenery.
3. **Headquarters of the Intermountain Region of the Forest Service and the Intermountain Forest and Range Experiment Station.** Ogden.
4. **Ogden Valley.** Scene of early Mormon settlement accessible through Ogden Canyon, the main route to Snow Basin. Snow Basin is one of the fine skiing developments in the West. This area is also an outstanding example of rehabilitation of a formerly denuded range through cooperation of city, county, state, civic, and federal groups and agencies.
5. **Davis County Experimental Watershed.** Farmington. Field headquarters for watershed management research. A conducted tour will be made to this area during the convention.
6. **Headquarters of the Wasatch National Forest.** Salt Lake City. State capitol and largest city in Utah and location of the Mormon temple and tabernacle. The state forester's office is located here.
7. **Bingham Canyon.** Largest surface copper mine in the world. An open pit mine with the sides terraced in a series of giant steps. Conducted

tours are made by Gray Line from Salt Lake City.

8. **Great Salt Lake.** A great body of water containing 26 percent salt. Bonneville Salt Flats west of the lake near Wendover is the location of the race track where the fastest automobile speed records have been set—394 miles per hour.
9. **Bear River National Wildfowl Refuge.** Road open the year around from Brigham City.
10. **Brighton and Alta Ski Resorts.** Each in a separate canyon—Big Cottonwood and Little Cottonwood. Both highly developed for recreation by the Forest Service. Lifts do not operate during the fall.
11. **Timpanogas Cave National Monument.** Located in American Fork Canyon. Tours conducted by the National Park Service from headquarters in American Fork Canyon. A rugged climb.
12. **Headquarters of the Ashley National Forest.** Vernal. Vernal is the location of a Museum of Natural History. The Ashley National Forest supports large areas of lodgepole pine and spruce.
13. **Headquarters of the Uinta National Forest.** Provo. Provo is the location of Brigham Young University, the largest L. D. S. college.
14. **Headquarters of the Manti-Lasal National Forest.** Price.
15. **Arches National Monument near Moab.** The beautiful natural bridges are easily accessible by road from Crescent Junction and Moab.
16. **Great Basin Research Center.** Ephraim. Field headquarters for range management research conducted by the Intermountain Forest and Range Experiment Station.
17. **High Uintas Primitive Area.** Located in the only major east-west mountain range in America, the area is noted for high mountain lakes and rugged mountain scenery. The Grandaddy Lakes are famous for unusual fishing. Accessible by foot or horseback only. Contact forest supervisors of either Ashley or Wasatch National Forests.
18. **Headquarters of the Fishlake National Forest.** Richfield. A center of stock raising and feeding. The Fishlake National Forest is noted for its excellent aspen timber.
19. **Capitol Reef National Monument.** A 20-mile buttressed cliff of colored sandstone, with twisted multi-layered formations. Access by paved road from Richfield, Loa, and Torrey or by primitive desert road from Hanksville.
20. **Headquarters of the Dixie National Forest.** Cedar City. The Dixie National Forest contains large areas of ponderosa pine, spruce, and aspen.
21. **Cedar Breaks National Monument.** Located here are a series of chasms cut 2,000 feet into the plateau country. These unusually colorful cliffs are a photographer's paradise. Access via short road from Utah State Highway 14 and U. S. 89 or 91. Area closed with snowfall.
22. **Bryce Canyon National Park.** A great natural bowl carved from brilliantly colored limestone by wind and water. Open the year around. Access via Utah State Highway 12 through Red Canyon —Dixie National Forest from U.S. 89.
23. **Zion National Park.** Features Zion Canyon, a deep narrow canyon lying between many gigantic masses of stone reaching a half-mile in height. Open the year around. Utah State Highway 15 passes through the most scenic portions of the park.
24. **Rainbow Bridge National Monument.** The greatest of the known natural bridges of the world. The bridge is almost perfectly curved 309 feet above the bed of a stream. It is accessible only by a 14-mile trail after long distance over fair to poor roads. Contact the National Park Service for information.
25. **Natural Bridges National Monument.** Three great rock arches. This monument is accessible by a low class dirt and gravel road from Blanding on State Highway 95.

October is a good period in which to explore the desert and semi-desert scenic wonders of southern Utah. The temperatures are mild and windstorms characteristic of early spring are unusual. The high mountain areas on national forests are beautiful during this time, but rain or early snow can make some roads difficult to travel.

Deer seasons in Utah vary from the regular season of October 18 to the end of October to special hunts and seasons extending into December. One deer is permitted on the regular hunt with additional deer permitted in some areas. Non-resident license $40.

Washington

1. **State of Washington, Department of Natural Resources, District Office.** Colville.
2. **Headquarters of the Colville National Forest.** Colville.
3. **Colville Indian Reservation.** Nespelem.
4. **Grand Coulee Dam.** This dam is 89 miles west of Spokane on U. S. Highway 2 and State Highway 4C. All good road and an exceptionally interesting tourist attraction with convenient facilities for eating and lodging.
5. **Dry Falls of Columbia River and Seepage Lakes, including Sun Lakes State Park.** Good lake fishing, swimming, camping, and most interesting geological features. Also sites of archeological investigation nearby. Located south of Coulee City Junction of U. S. Highway 2 and State Highway 7.
6. **Ginkgo Petrified Forest Museum.** Vantage. Here a short course in the geology of eastern Washington and similar lava-flow areas of the West can be obtained in as much or as little time as one wishes to invest. Also very interesting souvenirs made of polished specimens of petrified wood are available.
7. **Spokane and Inland Empire Timber Industries.** Spokane is the center of a large timber using industry. Situated here are sawmills, a pulp mill, wood flour plant, pole yards, and other timber using plants. At Sandpoint, Idaho, not far away, is a chipboard plant. At Post Falls, Idaho is a veneer plant. Sawmills are located in numerous Inland Empire cities such as Newport, Colville, Kettle Falls, Wash. and Sandpoint, Coeur d'Alene, St. Maries, Potlatch, Lewiston, Orofino, Pierce, and Grangeville in Idaho.
8. **Inland Empire Research Center.** Located at 157 South Howard Street in Spokane. This is a field unit of the Intermountain Forest and Range Experiment Station.
9. **Mt. Spokane State Park.**
10. **Palouse Wheat Fields.** The Palouse country is renowned for its wheat fields.
11. **State College of Washington.** Located at Pullman, with facilities for teaching and research. The department trains students in forestry, range, and wildlife. Visitors are welcome.

Wyoming

1. **Yellowstone National Park.** Season —late May to Mid-October. Fee—$2. Road closed in wintertime
2. **Headquarters of the Shoshone National Forest.** Cody.
3. **Headquarters of the Big Horn National Forest.** Sheridan.
4. **Devil's Tower National Monument.** Like a gigantic tree stump turned to stone, this monument looms 1,350 feet above the Belle Fourche River.
5. **Grand Teton National Park.** Highway to Jackson Hole open the year around. Unusual attractions—Jackson Lake, Jackson Lake Lodge, Mt. Moran—12,594 feet, and Grand Teton—13,766 feet elevation plus adjacent rugged mountain scenery. Lodgepole pine is the principal timber type.
6. **Headquarters of the Teton National Forest.** Jackson.
7. **Bridger Primitive Area.** Located in Bridger National Forest, within the same general area are Fremont Lake and Skyline Drive with boating, lake fishing. Nearby are Upper Green River, Green River Lake, and Square Top Mountain. Area contains 383,000 acres with numerous lakes in glaciated areas. Contains some of the best fishing waters in the West.
8. **Headquarters of the Medicine Bow National Forest.** Laramie. Also field headquarters for range and forest management research.
9. **Headquarters of the Bridger National Forest.** Kemmerer. Two new sawmills were recently constructed here to harvest timber from a spruce bark beetle infestation, and to begin building a new timber industry in Wyoming.
10. **Lander Trail.** Early emigrant route from Green River into Bear and Salt Rivers.

Opportunities in Forestry[1]

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To GAIN some perspective of present and future opportunities in the field of forestry, I am going to review briefly three outstanding accomplishments in forestry during the past 20 years.

At the head of the list, I place the story of the development of protection against fire. A few short years ago, more acres of land in the Douglas-fir region were burned each year in accidental fires, slash fires, and escaped slash fires than were logged. Fire was called Public Enemy No. 1.

Many leading foresters repeated over and over again that forestry was 90 percent protection against fire — and at the time they were right. I could not attempt to list the men who have been responsible for reducing fire to a calculated risk, thus removing one of the chief obstacles to the investment of money in future forest crops. In early fire research, the names of Harry Gisborne and Bush Osborne stand out. It is likewise difficult to think of the development of protection in the Northwest without calling to mind such men as the late E. T. Allen and Charlie Cowan who this year is retiring from his position as manager of the Washington Forest Fire Association. But the real achievements have come about through the combined efforts of countless people: private land owners, federal and state employees, and public minded laymen alike. They were all spurred on by the constantly increasing number of foresters.

The Tree Farm movement, Keep Green, Smokey Bear, and other persistent education programs, both within the forest industries and with the forest using public, have developed a high level of public consciousness working toward the prevention of man-caused fires. The pattern has been similar in other forest regions.

The second story of past accomplishments is about reforestation. It is safe to say that 25 years ago, most reforestation was accidental. There were a few exceptions. Perhaps the most notable of these was the old Great Southern Lumber Company (now Gaylord Container Division of Crown Zellerbach) which, starting in the early 1920's, has now planted over 130,000 acres.

In the Douglas-fir region, the development of measures designed to insure natural reforestation began in 1934. A few years earlier, Leo Isaac had conducted a study in the Wind River Valley on the dissemination of Douglas-fir seed. Basing their plans almost entirely on Leo's findings, a handful of energetic, young foresters, with the support of some industrial leaders, gradually brought about modifications of established logging practices to provide natural sources of seed for the areas logged. The seed area idea quickly gave way to the so-called staggered settings or patch logging which has been adopted as standard practice throughout a substantial segment of the Douglas-fir industry.

During the same period of Pacific Northwest development, foresters in the southern pine region developed methods for converting over-cut, over-farmed, over-burned lands into fast growing plantations of loblolly and slash pine.

Last year, 1,171,000 acres of forest land were planted in the United States. It appears that even more will be planted this year.

The third story is about management plans. I have no figures on the acreage of forest land that today is operated in accordance with management plans worked out by foresters. It is safe to say that the majority of forest ownerships of over 50,000 acres have been inventoried and the stands classified. Plans have been developed on these lands to meet the major operating problems. Growth has been calculated, and within the economic limits of the owners, the periodic cuts are held reasonably close to the yield.

This development is not so spectacular as fire fighting. It does not hold the conservation appeal associated with reforestation. It has been, nonetheless, a substantial accomplishment of foresters during the past two decades. Studies of sustained yield possibilities and the development of allowable cut estimates have done more to advance forestry in the Douglas-fir region, and in other regions I expect, than most people realize.

The major forestry problems of 25 years ago were also the major opportunities for foresters at that time. I suggest, therefore, that a fair appraisal of today's opportunities in forestry can be gained by looking at some of today's forestry problems.

Current Problems

Current problems in forestry can be generally grouped into four broad categories.

Public relations.—I would list two serious problems having to do with some public relations aspects of forestry: (1) taxation, and (2) competition for the use of forest land.

We know that the production of continuous forest crops is a long term venture beset with many risks. Fire, insects, and disease are constant threats and substantial annual expenditures are required to keep them under control. Forestry is not the kind of business that one can enter, or drop out of quickly, with the ups and downs of economic conditions. Stability

[1]Adapted from a talk presented at the Washington State College Forestry Banquet, Pullman, Wash., March 22, 1958.

of the forest industries depends not only on maintaining adequate safeguards against fire, insects, and disease; it also depends on stable and reasonably predictable tax laws that recognize the prolonged life cycle and deferred returns on forestry investments. An understanding and constructive public attitude, and taxing authorities and public officials who understand the problems of permanent forest management are as essential to a successful forestry enterprise as good management practices in the woods.

If I were to rate the potential risks to long range, sustained yield, industrial forest management, I would place taxation close to the top of the list. Yet, taxation, like protection against fire and insect epidemics, is a problem that foresters can help to solve. Foresters, as a group, by virtue of their training, can contribute substantially to the development of laws that will tax forest investments on a basis that is equitable with the taxation of other investments.

A second public relations problem is the growing competiiton for the use of forest land. As population increases and real income per capita rises, pressures upon our land resources will become greater and land use conflicts will sharpen. This will apply to both publicly and privately owned land.

Few land uses are exclusive of all others and the potential uses are often complexly interrelated. Multiple use as a principle has gained wide acceptance but too often one segment or another of the population, in its zeal to achieve a single objective, takes the attitude that multiple use applies to everyone but them. Thus, we face continued pressure on forest land for wilderness areas, water impoundment, road and powerline rights-of-ways, and other exclusive or limited uses of the land.

Plans must be worked out for broader use of private forest land for recreation, for water and for other uses. By the same token, the reservation of public land for limited use by small segments of the population will have to be held within reason. Foresters, in both public and private employ, will face the task of helping to work out sane, rational land use patterns amid sharply conflicting, sometimes zealous, and ofttimes selfish interests. Solving these problems will require patience, diplomacy, and a broad understanding of natural resource use.

Silvicultural.—The second category of problems can be broadly classed as silvicultural. We point with justifiable pride to past accomplishments in the development of silviculture. We say, with considerable assurance, that progress in silviculture generally has kept pace with the overall needs of our forest economy. Yet, in terms of what we need to know in order to develop the full use of the land, only the surface has been scratched.

The present pace of reforestation mentioned earlier has indeed been a major accomplishment of the forestry profession. The problems of cutting planting costs, rehabilitating land occupied by inferior species, site preparation and improving and extending seeding techniques, however, still challenge the ingenuity of foresters in every forest region.

As markets for the products of second growth stands become available, effective cultural practices will have to be developed to protect or improve the site, to produce greater yields, and to afford some measure of silvicultural control against insects and disease.

Perfection in silviculture will perhaps never be fully attained. Changes in economic conditions and developments in technology will combine to constantly change the rules of the game and present new problems.

Tree improvement programs and genetics studies have been launched in several forest regions within the past 5 years. On the surface, these fields offer intriguing possibilities to increase yields and to grow trees to specification as to grain, fiber structure, and density. Even the most optimistic enthusiasts, however, realize that present knowledge is fragmentary. Productive results in this field will require more shoulders to the wheel and years of effort.

Interest in establishment of cone orchards, grafting, and hybridization; collecting, processing, and storing seed has been sharply stimulated by recent developments in direct seeding. Where pounds of seed are required for the production of nursery stock, tons are required for broadscale aerial seeding.

In the silviculture category, I include research in the biological sciences bearing on forestry.

Forestry practices have largely used up the back log of research that foresters had to work with a few years ago. The development and expansion of more intensive forestry along many lines is being slowed by the lack of fundamental knowledge in the physiology of the very trees we are trying to grow. Little is known of the physiology of tree seed, or of the relationship between nutrient requirements of our commercial species and growth, or between nutrition and resistance to insects and disease. The use of systemic chemicals, foliar and basal sprays on woody plants to regulate growth and to protect trees against animals, insects, and disease is receiving increased attention from the plant physiologists. As more knowledge is gained in these fields, in forest soils, and in many other areas, the horizons of forestry will expand.

Forest protection.—A third major category of forestry problems presenting opportunities to future foresters is the protection of forests from insects, disease, animals, and, of course, the ever present threat of fire.

There are a variety of statistics on the relative damage caused by fire, insects, and disease. Though the information is incomplete, well-informed people today rate both disease and insects as many times more destructive than fire.

As a profession, we foresters are in about the same position today in combating insects and disease that we were 30 years ago in solv-

ing the fire problem. Our good friend, Paul Keen, and others, in developing reasonably effective silvicultural control of the western pine beetle, have pointed the way toward developing indirect control of other insect pests. Diseases which often occur underground or inside the bole of the tree present even knottier problems than do insects. To attempt to produce tree crops without controlling insects and disease is as unrealistic as growing cotton without controlling the boll weevil.

Mice and other small mammals living on a diet of tree seed; rabbits, mountain beaver, porcupines, deer, bear, and elk all make serious depredations on seed, seedlings, and saplings. Here is a need for foresters, game managers, and outdoor recreationists to work together to solve the problem of growing both trees and game. To emphasize the size of the problem of animal damage, our foresters estimate that wildlife damage to young growing stock on Weyerhaeuser tree farms alone amounts to $875,000 a year.

Economics.—The fourth category of problems I should like to discuss comes under the heading of economics.

The only force that will make intensive forestry possible is a stable demand for the products we grow. Wood must be grown profitably and competitively with other products.

Management plans must be developed that are not only silviculturally sound but that are also financially sound. Rotations must be geared to the requirements of our economy and to the technological developments in manufacturing. Conversely, foresters along with engineers and merchandisers face the task of developing manufacturing processes and markets for products that can be made from trees which can be grown economically.

I don't subscribe to the theory that in the future all wood will be ground up or taken apart and converted into pulp, or extruded as plastics or other molded materials. It is becoming increasingly apparent, however, that the size of trees we will be able to produce will be strongly influenced by the rotation age that will give the maximum average annual yield. The effect of tree size on harvesting, transporting, and processing costs, will, of course, be an important element in the formula. It is my feeling that gluing, laminating, and new technological developments will produce the grades and sizes required more economically than we can hope to obtain them by letting the trees grow larger. Neither the time nor the money will be available to grow timber to the size and quality that our present mills are designed to handle.

Here, then, are some of the problems that confront the profession of forestry. Likewise, here are opportunities for present and future generations of foresters.

Favorable Circumstances

Having taken a look at some of the specific opportunities in forestry, it might be of interest to discuss "opportunity" in a broader sense.

The dictionary defines "opportunity" as "a favorable juncture of circumstances." So we might ask, "Are the circumstances favorable for forestry today?"

The first circumstance that comes to mind is that all indications point to the fact that, despite temporary shifts in our economy, demands on all our natural resources will rise sharply in the future. We are all familiar with some of the basic predictions of the Stanford Report and the Timber Resources Review on future wood requirements. In a recent educational TV program on resource economics, the following comments were made:

"From 1900 to 1950, the population of the United States doubled. It is now increasing at the rate of 3 million per year. During this same period, the consumption of water increased 5 fold; steel 8 fold. The use of minerals increased 11 times. While the use of wood as lumber remained about constant paper consumption increased 14 times. From the beginning of World War I to 1950, the United States used more minerals than had been used by the rest of the world during all of history."

This simply illustrates the rapidity with which developments take place and argues strongly that more and more demands will be placed on all of our natural resources. It follows that all of our resources will have to be used to better advantage.

A second favorable circumstance lies in the fact that the developments in forestry thus far have demonstrated the possibilities of providing future timber requirements by growing trees as crops. A few short decades ago, the economics of the forest industry, and the lack of practical know-how in silviculture and protection, combined to make timber cropping a dubious venture. Even those most conservation-minded land owners who had an earnest desire to perpetuate the forests that supported their industry found it next to impossible to justify investments in forestry. In contrast forestry today is recognized as an integral and important phase of management in the forest products industries. And, particularly in regions where rotations are short, people not in the forest products business are making private investments in forest land.

A corollary to this is the trend of stumpage values, which, while fluctuating with temporary economic conditions, has been steadily upward. Long term prospects do not indicate any substantial change in this trend.

A fourth point to consider is that the investment required today to build a pulp mill or an integrated pulp-lumber-plywood operation runs upward from 30 million dollars for the minimum economic unit. Modern sawmills cost up to $20,000 per thousand board feet of daily capacity; pulp mills cost in the vicinity of $80,000 per ton of daily capacity. Few companies can justify an investment on this scale without also taking steps to insure a more or less permanent supply of raw materials.

From the standpoint of those of us in the forestry profession and those who are preparing to enter it, these conditions would seem to conform to Mr. Webster's "favorable juncture of circumstances" or opportunity.

The Human Element

There is, however, another element in this picture. It has to do with people; with each of us and with our associates in the forestry profession. It has to do with our abilities to measure up to the opportunities that are open to us.

In the Weyerhaeuser Timber Company, it has been our experience over a considerable period of years that few foresters fail to handle the jobs assigned them or are overlooked when promotions are made due to lack of technical training and ability.

Dr. Joseph Illick, Dean Emeritus of the New York State College of Forestry, during his long career as an educator, has maintained a record of the hundreds of graduates who have attended his classes. When one of his boys, as he calls them, has not measured up to standard, Dr. Illick has taken the pains to find out why. Dean Illick's experience parallels ours in that he has found few failures resulting from lack of technical ability. Dean Illick atributes most failures to the lack of ability to get along with people, and here again his experience is somewhat parallel to ours.

Industry is operated and managed by people. Forestry is practiced by people. Laws are passed by people. Ideas are conceived by people, transmitted to people, and translated into action by people.

Abraham Lincoln once said, "Public Opinion is everything. Without it, nothing can succeed; with it, nothing can fail."

The President was commenting on a problem of national scope but the truth of his statement can be applied to each of us.

The ability to get along with people, to develop and maintain good working relationships with employers, employees, and associates, perhaps presents the greatest problem of all. Likewise, it may present the greatest opportunity of all to contribute one's full worth to whatever he undertakes and to receive whatever satisfaction and reward there may be for his accomplishment.

In Conclusion

Today, there are some 16,000 professional foresters employed in forestry compared with perhaps 3,000 twenty-five years ago. Taking the pessimistic view, it might be inferred from this that the field is getting crowded and that the opportunities today are not so great as they were 25 years ago. I am sure that such is not the case.

Most of the foresters who have entered the profession have not only demonstrated the value of their own services to their employers but in so doing they have created additional jobs for more foresters.

Twenty-five years ago, there were only two or three foresters employed by Weyerhaeuser Timber Company. Today there are over 150.

We have flying foresters and financial foresters. We have foresters in our safety program, in the tax department, in public relations, and in industrial relations. Others are in sales, pulp, plywood, and lumber manufacture, in log production, and in forestry and forest products research. Some of our branch managers and woods managers are foresters. Two of our vice presidents are foresters—we even have foresters in our forestry departments.

We hear a lot these days about the growth and drain on the forests of our nation. Considerable alarm has been expressed over the fact that, until only recently, forest drain exceeded forest growth. Even now there are warning cries that, in certain areas, important commercial species are being used up faster than they are being replaced.

It is well to give these matters serious consideration. But, I am as optimistic as one of the prominent consulting foresters in the South who pointed out recently that the most intensive forestry is practiced in the areas where there the competition for wood is greatest. This applies to large industrial properties and to small individual tree farms. He went on to say that in the South, the rate of forest growth will keep up with the drain until the full potential of the growing site is achieved and the potential growth, he added, is more than twice the present growth.

There are 489 million acres of commercial forest land in the United States. Planning and providing protection for this vast area from fire, insects, and disease is a job for foresters. Making sound management plans and realistic cutting budgets is certainly a function of foresters. Working out good relations with the public will fall largely on the shoulders of foresters. Wood technologists, with the assistance of engineers and chemists, will have the responsibility of product and process development to secure and maintain profitable markets for the timber crops that can be grown.

No one can predict the number of foresters that will be required to handle the many and varied tasks that comprise this undertaking. It appears obvious, however, that in addition to many "general practitioner" foresters, the need for specialists all along the line will continue to increase substantially.

There is a job to be done; a professional service to be rendered. It all adds up to opportunity.

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Wisconsin-Michigan Section Meets

The Wisconsin-Michigan Section will hold its summer field meeting September 5-6 at Boyd's Mason Lake Resort, on Highway 70, 13 miles west of Fifield, Wisc. Tours of the Flambeau River State Forest and the Chequamegon National Forest highlight the program.

The Market Outlook for Lodgepole Pine[1]

John H. Wikstrom
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FOREST MANAGERS in the lodgepole pine region are, in one respect, much like the skipper pacing the deck hoping to find a buyer for all the cargo in hold No. 3 before it becomes completely spoiled and unsalable. We have been anxiously watching and pushing for development, hoping to be able to market lodgepole pine timber before large quantities of existing mature and overmature stands become lost to the vicissitudes of time. And, even though we are now selling more lodgepole pine than ever before, we have a large volume of it. The forest land area supporting this species exceeds 14 million acres. It is the third largest timber type in the West. Will we be able to sell all of our available lodgepole pine in the markets of the future?

More importantly, should we, as forest managers, continue to grow lodgepole pine, particularly on sites that might produce something else? What emphasis should we place on the species in our management plans? These questions have immediate importance to foresters who must always be planning one tree rotation or more into the future. The purpose of this paper is to consider the opportunities and problems associated with this planning and to indicate as far as possible the emphasis that should be placed on growing lodgepole pine in present and future management.

Lodgepole Uses

The Timber Resource Review[2] and other studies of future wood needs show quite conclusively that consumption of wood has expanded and will continue to expand as population grows. The general consensus is that we will need all the wood our forest land can produce before the end of this century. This appears especially true for the softwoods that yield most of our lumber. However, even though lodgepole is a softwood, the question is: Will it yield products that are acceptable in the market? What are the indications that we can grow it competitively with other species?

Lodgepole pine is gaining the reputation of being a multiple-purpose wood. It is being cut for lumber, poles and piling, and for fiber products. But in the economic world there is wood—and there is wood. How good is lodgepole pine? How does it compare with other species for different uses?

It is comforting to know we can use lodgepole for lumber. It is much more important to know that, as Table 1 shows, its wood compares favorably with ponderosa pine for lumber. And here is the economic fact that emphasizes the importance of lodgepole pine: Since it has wood properties comparable to those of ponderosa pine, it is one of our better soft-textured softwoods and these command the highest prices in the lumber market because they are in shortest supply.

Lodgepole pine is also an important source of medium and small poles and piling. For uses requiring medium strength, it has no equal.[3]

As a pulping species lodgepole again rates high. It reduces readily under both sulphate and groundwood processes. Sulphate pulp produced from lodgepole pine is strong and is easily bleached to a high degree of brightness. Ground lodgepole pine pulp has satisfactory strength, excellent color. The energy requirement for grinding is reasonable.

Unfavorable Economic Factors

If lodgepole pine's properties would permit it to be substituted for other high priced softwoods then why the concern over its future? Wood properties alone are not enough to make lodgepole a forest leader overnight, for as a species it poses some important handicaps to utilization.

Lodgepole pine utilization is handicapped first of all by the small size of the species. Small trees are more expensive to log and handle; and a large portion of the lumber recovery is in narrow boards. These handicaps were discussed at length in a recent

[1]Adapted from a paper delivered before the Northwest Scientific Assoc.; Spokane, Wash., December, 1957.

[2]Forest Service, U. S. Dept. Agric. Timber resource review (Preliminary Draft). 1955.

[3]Crossley, D. I. Lodgepole pine and its increased utilization. Forestry Chron. 33(1):19. 1957.

TABLE 1.—LODGEPOLE PINE COMPARES FAVORABLY WITH PONDEROSA PINE IN IMPORTANT PHYSICAL PROPERTIES

	Ponderosa pine	Lodgepole pine
Weight—pounds per cubic foot (8 percent moisture)	27.5	28.2
Strength—static bending, fiber stress at proportional limit, P.S.I. (12 percent moisture content)	6,300	6,700
Shrinkage based on dimensions when green; dried to 6 percent moisture content.		
Tangential (percent)	5.0	5.4
Radial (percent)	3.1	3.6
Hardness—load required to imbed 0.444-inch ball to one-half of its diameter, pounds (12 percent moisture content)	450	480
Painting class[1]	3	3

[1]Forest Products Laboratory, U. S. Dept. Agric. Wood handbook. Agricultural Handbook 72. 1955. 528 pp.

publication.[4] It is not necessary to dwell on them except to emphasize that marketing narrow boards is the principal problem of lodgepole pine lumber producers. Quality-wise the species poses no real problem. It does not produce much select grade lumber but neither does it produce much low-grade lumber. The bulk of the recovery is in the high common grades. However, within any given grade, the narrow 2-, 4-, and 6-inch boards are worth less than the more popular 8- and 10-inch widths.

Lodgepole pine utilization is handicapped secondly because it usually occurs as a type on less accessible land. A small tree is always economically less accessible than a large tree in the same location because of the higher cost of handling. But topographically lodgepole pine generally occurs at higher elevations than most of the more widely used species that grow in this region and is geographically further removed from processing centers and points of consumption than the other more popular species.

Recent Trends in Lumber Use

It is significant that in recent years part of the drawbacks to lodgepole pine use are being overcome. The price of wood for some uses has increased and now smaller trees and more remote timber can be operated. As a result, lodgepole pine is now advancing in the market. Prior to World War II the total cut of the species for lumber was averaging about 70 million board feet annually. In 1956 the cut in the Rocky Mountain States alone was estimated to be 200 million board feet. The market for lodgepole pine poles followed a similar trend. In Montana alone 237 thousand were harvested in 1956 compared to fewer than 10,000 poles annually prior to World War II. Also, pulpmills and fiber board plants are now using some lodgepole pine. Two new fiber board plants have been built recently in Oregon that use or will use a lot of this species.

The production data cited show that lodgepole pine is beginning to move in the different principal wood markets. However, opportunities for selling lodgepole pine either now or in the future cannot be predicated on these past trends alone. In order to better understand what has happened or is likely to happen in the future we need to examine market statistics more closely.

Since lodgepole pine is one of our better soft-textured softwoods, it is quite obvious that the supply of other species in this group as well as the price of lumber must be taken into account in any evaluation that is made. According to data presented in the Timber Resource Review, the real price of lumber has increased 60 percent since 1939. However, this increase in price has not been the same for all species nor has it been accompanied by an increase in use of all species. Soft-textured softwoods have experienced the biggest price increase. The real wholesale price of Douglas-fir, for example, increased 50 percent between 1939 and 1954. During the same period, the wholesale price of such popular soft-textured species as ponderosa pine and white pine increased 89 percent and 84 percent, respectively.

Production figures for selected soft-textured softwoods (Table 2) show that while the real price of lumber increased, the production of both white pine and ponderosa pine actually declined from prewar levels. The cut of sugar pine, another strong contender in this group of soft-textured woods, stayed about the same. Lodgepole pine lumber production, on the other hand, increased roughly 200 percent. Of course there are other new contenders in this group of woods. The principal one in the lodgepole pine area is spruce. The production of spruce in the West in 1954 was 117 percent above the 1938-41 average for the species.

The increase in the real price of lumber shows quite clearly that the demand for lumber has increased. But the smaller increase in the wholesale price of Douglas-fir as compared to the increase in the value of white pine and ponderosa pine illustrates that supply problems are more critical among soft-textured softwoods. The fact that production of lodgepole pine and spruce lumber increased in response to increase in demand, whereas production of ponderosa and white pine decreased, indicates that supplies of the former were adequate to permit response to the rise in price whereas supplies of the latter two species were not. This observation is further substantiated from forest survey data. It is common knowledge from timber surveys that accessible ponderosa

[4] Wikstrom, J. H. Lodgepole pine—a lumber species. Intermountain Forest and Range Exp. Sta., Research Paper 46. Ogden, Utah, 1957. 17 pp., illus.

TABLE 2.—CHANGE IN PRODUCTION OF LUMBER FROM SELECTED SOFT-TEXTURED SOFTWOOD SPECIES, WESTERN UNITED STATES[1]

Species	Change in production 1938-1941 average to 1954
	Percent
Lodgepole pine	+200
Ponderosa pine	−3
Western white pine	−38
Sugar pine	+1
Spruce	+117

[1] Census except for 1954 production of lodgepole pine which was adjusted based on Forest Survey statistics.

TABLE 3.—RELATIVE TREND IN WESTERN REDCEDAR AND LODGEPOLE PINE POLE PRODUCTION IN MONTANA, 1937-1956[1]

Year	Species	
	Western redcedar	Lodgepole pine
	Percent of total for state	
1937	83	10
1946	3	88
1948	10	69
1950	7	61
1952	7	58
1954	3	74
1956	1	78

[1] U.S. Forest Service, Forest Survey.

pine and white pine sawtimber have been overcut. Foresters are aware that the less accessible reserves of these species are inadequate to meet the total demand for soft-textured softwood. This suggests quite clearly that if the real price of wood for lumber continues to rise, increasing amounts of the cut will come from lodgepole pine.

The data in Table 2 show that if our appetite for wood continues to grow, as was indicated in the Timber Resource Review and in a recent study of market prospects for Mountain States timber,[5] lodgepole pine could become a popular lumber species in the relatively near future. Not only is lodgepole pine lumber production increasing to satisfy part of the market for soft-textured softwoods once supplied by white pine and ponderosa pine, the studies cited indicate the demand for this kind of wood for lumber will likely continue to increase.

Increased Pole Production

Compared to the lumber market, the pole market absorbs a relatively small amount of wood. However, since lodgepole pine is a preferred pole species, this market should not be overlooked. Data were not available on the trend in real price of poles and piling; consequently, it was not possible to make as complete an analysis of the pole market as of the lumber market. However, there is reason to believe that the production situation in the pole market is quite similar to that in the market for lumber. Table 3 shows there has been a rather dramatic increase in the production of lodgepole pine poles. In contrast, production of western redcedar poles, which for years was the standard for comparison in the pole market, has declined.

Increased Pulp Use Foreseen

As the Timber Resource Review indicates, the real price of wood for pulp over the past 30 years or more has changed very little. Increased use of lodgepole pine therefore probably reflects only local shortages in certain pulp producing areas, possibly combined with some technological factors. Pulp producers in the Lake States have imported some lodgepole pine from Montana because they could not supply their needs locally. No doubt the quality of this Montana pine for pulp influenced the decision to go so far for raw material. However, the general demand for fiber products is expanding rapidly, and it can only be a matter of time until new sources of pulpwood will be needed. If this country develops as anticipated in the Timber Resource Review and in the study of market prospects for Mountain States timber, the lodgepole pine resource will feel increased pressure from this industry as well. In fact, Johns-Manville is now building a plant to convert this species.

Problems of Management

Much of this discussion has centered on the economic factors that indicate why the market future for lodgepole pine could be a bright one as it has properties and characteristics that make it an ideal wood for popular uses. However, there are some problems facing timber managers in developing this timber type, some of which were mentioned earlier, and these problems must be solved before lodgepole pine can rank with ponderosa pine and white pine in importance.

The rise in the real price of lumber in particular, and the continued upward trend in wood value in general, have gone a long way to overcome the problem of economic accessibility. At current price levels much of the lodgepole pine type supporting sawtimber-size trees is operable by sawmills. However, if development is to progress as fast as needed to bring the type under management and at the same time help to keep wood competitive, ways must be found to reduce the cost of handling small timber. A practical solution must be found to the problem of narrow boards that small trees produce in such abundance.

There is, of course, another approach to both the problem of small trees and narrow boards which needs to be evaluated. That is the opportunity through management to grow a more marketable lodgepole pine forest product. So far, lack of utilization has been used to excuse lack of management in most lodgepole pine stands. This may be a valid excuse so far as mature and overmature stands are concerned. It hardly excuses our failure to exert more management effort in young stands.

The need to evaluate the management opportunity in growing lodgepole pine probably cannot be overstressed. This species is adaptable over a wide geographical range. It is a clean growing tree, not particularly susceptible to disease and decay, and is capable of a good growth rate on many sites where other species might grow. If lodgepole pine is a species that responds well to management, as many foresters say it is, then it may well be one of the species we should be concentrating on in our effort to increase the supply of soft-textured softwoods.

Probably no discussion in forest economics, particularly when dealing with an undeveloped forest type that has a potentially good future, would be complete if it did not at least mention the economic problem that is becoming almost proverbial to public foresters, but which remains unsolved. That is the problem of properly financing forest resource development and management on national forests. Lodgepole pine has the potential of yielding a good return in the future. But to realize this return the resource must be developed and managed. Piece-meal financing of a road here and a road there wherever a sufficient volume of salable timber is available for immediate amortization will not accomplish the needed development. And, postponing management for lack of development can only mean postponed income and economic loss.

Forestry is a long-term under-

[5] Hutchison, S. Blair. Market prospects for Mountain States timber. Intermountain Forest and Range Exp. Station, Research Paper 50. 1957. 31 pp., illus.

taking and this in itself should imply long-term financing. That financing must be geared to the long term and amortized against long-term returns wherever an immediate forest management need exists and wherever the volume of salable material is insufficient to cover all costs.

To mention these problems which managers of lodgepole pine timber must face in no way departs from the original theme of the market outlook for lodgepole pine. This timber type appears to be good as a long-range prospect; but this prospect is beset with problems. These problems should be only short-range but do have an important and direct bearing on the future of this species. We cannot ignore them in our forestry planning.

Conclusion

Lodgepole pine has that combination of wood properties and physical characteristics that makes it a good source of soft-textured softwood lumber. It produces a preferred pole, and it appears destined to be a preferred species among pulp operators once the cost of round pulpwood becomes high enough that it can be operated. We cannot completely evaluate the market future for lodgepole pine until the problems of the cost of handling small trees and marketing narrow boards have been dealt with properly. There is also the need to evaluate the relative opportunities for growing the different species that can be grown on sites where lodgepole pine can and will grow. Our present knowledge is nonetheless complete enough that we can see a potentially important economic role for lodgepole pine — sufficiently important to justify immediate emphasis on the problems that now handicap us in development of that role and in lodgepole management.

SECTION BOX SCORE 1958 MEMBERSHIP

	Applications Received[1]		
	September 1958	Total 1957	Total 1958
Allegheny	1	68	50
Appalachian	3	71	22
Central Rocky Mountain	0	24	15
Central States	0	30	19
Columbia River	0	55	50
Gulf States	5	84	43
Inland Empire	0	21	16
Intermountain	0	6	31
Kentucky-Tennessee	0	8	3
New England	1	62	44
New York	1	37	25
Northern California	0	39	11
Northern Rocky Mountain	2	49	25
Ozark	3	92	21
Puget Sound	1	61	47
Southeastern	4	132	93
Southern California	0	3	0
Southwestern	0	7	1
Upper-Mississippi Valley	3	69	64
Washington	0	10	1
Wisconsin-Michigan	3	84	71
Totals	27	1,012	652

[1]Students, Juniors, Affiliates, Associates (Initial) grade only.

SCHOOL BOX SCORE 1958 MEMBERSHIP

	Student Applications Received		
	September 1958	Total 1957	Total 1958
Alabama Polytechnic Institute	0	19	22
University of California	0	30	56
Colorado State University	0	19	15
Duke University	0	13	3
University of Florida	1	6	16
University of Georgia	1	86	43
University of Idaho	0	19	14
Iowa State College	0	35	21
Louisiana Polytechnic Institute	0	18	5
Louisiana State University	0	41	7
University of Maine	0	31	22
University of Massachusetts	0	10	4
Michigan Coll. of Mining & Tech.	0	29	5
Michigan State University	1	24	30
University of Michigan	0	14	17
University of Minnesota	0	28	31
University of Missouri	0	62	7
Montana State University	0	45	17
State University of New York	0	25	16
North Carolina State College	0	36	1
Oregon State College	0	29	30
Pennsylvania State University	1	32	24
Purdue University	0	18	18
Utah State University	0	5	24
University of Washington	1	27	27
West Virginia University	0	19	19
Yale University	0	7	5
Totals	5	727	499

Herbage Utilization on Pine-Bunchgrass Ranges of Colorado

W. M. Johnson and Elbert H. Reid

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TO MANAGE ANY range effectively, the operator needs to know what plants make up the forage supply, their relative value as forage, their ability to withstand grazing, and when and how they are grazed. This paper presents the results of studies to determine how cattle utilize several important species on ponderosa pine-bunchgrass ranges in Colorado.

The studies were made at the Manitou Experimental Forest in central Colorado during 1950 and 1952 on six experimental range pastures that had been grazed at different intensities since 1941. The three grazing intensities had each created different range conditions as reflected in both amount and composition of the vegetation. The study, therefore, gives examples of utilization on areas grazed at three intensities where the conditions are those created by the different levels of grazing. The differences in utilization are not necessarily those expected when ranges in similar condition are grazed at the three levels.

Yearling heifers grazed the pastures from the first of June to the end of September in both years. The study was confined to grassland openings that made up 12 to 32 percent of the pasture areas. These openings were always more heavily grazed than the timbered areas that made up most of the remainder of the pastures.

In 1950, 90 plots were selected at random on areas that past records indicated were grazed consistently at either a heavy, moderate, or light rate of utilization. In the light grazing 10 to 20 percent of the grass and sedge herbage was removed; moderate grazing, 30 to 40 percent; and heavy grazing, 50 percent or more. On each plot herbage composition was estimated by species, expressed as percentage of total weight of herbage produced. Utilization was estimated on each plot in mid-July, mid-August, and late September. Utilization was expressed as percentage of herbage removed by weight. Utilization estimates were repeated on the same plots in 1952.

Data on utilization and herbage composition were collected for the following species or groups of species: (1) Little bluestem (*Andropogon scoparius* Michx.), (2) Parry danthonia (*Danthonia parryi* Scribn.), (3) Blue grama (*Bouteloua gracilis* [H.B.K.] Lag.), (4) Arizona fescue (*Festuca arizonica* Vasey), (5) Mountain muhly (*Muhlenbergia montana* [Nutt.] Hitchc.) (6) Other grasses. (7) Sedge (*Carex* spp. primarily *C. heliophila* Mack.), (8) Rose pussytoes (*Antennaria rosea* [D. C. Eaton] Greene), (9) Purple milkvetch (*Astragalusagrestis* Dougl.), (10) Trailing fleabane (*Erigeron flagellaris* A. Gray), (11) Other weeds, and (12) Fringed sagebrush (*Artemisia frigida* Willd.).

Composition of the Vegetation

The vegetation on the areas studied consisted of a large number of species. Ranges in good to excellent condition contained as many as 35 different grasses. Forbs too were numerous but they fluctuated in abundance from year to year. A few forbs were fairly stable in the composition, and some are useful indicators of range condition. In general, however, only a few plants were either sufficiently frequent or abundant enough to warrant intensive study.

Only six species were both abundant enough or palatable enough to be important as cattle forage: Little bluestem, blue grama, Arizona fescue, mountain muhly, sedge, and fringed sagebrush. Other grasses found commonly but in small amounts were Parry danthonia, bluestem wheatgrass (*Agropyron smithii* Rydb.), bearded wheatgrass (*A. subsecundum* [Link] Hitchc.), Canby bluegrass (*Poa canbyi* [Scribn.] Piper), bottlebrush squirreltail (*Sitanion hystrix* [Nutt.] J. G. Smith), pine dropseed (*Blepharoneuron tricholepis* [Torr.] Nash), and prairie Junegrass (*Koeleria cristata* [L.] Pers.).

Among the forbs, purple milkvetch, rose pussytoes, and trailing fleabane were the most common. Other common genera included Chenopodium, Chrysopsis, Orthocarpus, Thermopsis, Potentilla, Solidago, and Aster.

At the time of the study, differences in both the amount and composition of the vegetation had resulted from the differences in grazing intensities the study areas had received since 1941. No specific measurements of total herbage production were made on the 90 plots. However, in other sampling of the experimental pastures it was found that the total production of grasses and sedges in 1947 under the three conditions represented, averaged 704, 673, and 249 pounds per acre for the lightly, moderately, and heavily grazed areas, respectively.

As shown in Table 1, 78 percent

TABLE 1. — HERBAGE COMPOSITION ON GRASSLAND AREAS GRAZED AT LIGHT, MODERATE, AND HEAVY RATES AT THE MANITOU EXPERIMENTAL FOREST

Species	Herbage composition based on total weight produced		
	Lightly grazed	Moderately grazed	Heavily grazed
	Percent		
Little bluestem	2	1	5
Blue grama	1	3	21
Arizona fescue	21	41	11
Mountain muhly	57	45	38
Sedge	3	4	7
Fringed sagebrush	2	2	11
All others	14	4	7
Total	100	100	100

[1]With headquarters at Fort Collins, Colo. in cooperation with Colorado State University.

FIG. 1.—A typical lightly grazed area in the ponderosa pine-bunchgrass type. Only 20 percent of the herbage has been utilized.

of the herbage composition on the lightly grazed areas was produced by mountain muhly and Arizona fescue. Little bluestem, sedge, blue grama, and fringed sagebrush were of minor importance; the last two made up only 3 percent of the vegetation. A variety of miscellaneous species such as bluestem wheatgrass, bearded wheatgrass, Canby bluegrass, bottlebrush squirreltail, and prairie Junegrass made up 14 percent of the vegetation.

In contrast, on the heavily grazed areas, Arizona fescue and mountain muhly made up only 49 percent of the herbage. Blue grama and fringed sagebrush made up 32 percent. Sedge was somewhat more prominent than on the lightly grazed range. Miscellaneous species constituted 7 percent of the herbage. These were predominantly sleepygrass (*Stipa robusta* [Vasey] Scribn.) and tumblegrass (*Schedonnardus paniculatus* [Nutt.] Trel.), although the more valuable western wheatgrass was usually present.

Moderately grazed areas were predominantly Arizona fescue and mountain muhly. Blue grama and fringed sagebrush were slightly more abundant than on the lightly grazed areas.

Palatability and Forage Composition

On lightly grazed areas mountain muhly, Arizona fescue, little bluestem, and sedge were by far the most palatable of the six species studied (Fig. 1). Mountain muhly and Arizona fescue, being most abundant, made up about 95 percent of the forage (Table 2). Little bluestem and sedge produced about 5 percent of the forage. Although taken quite well by cattle, they were not sufficiently abundant to be important forage producers.

Blue grama was grazed very lightly and fringed sagebrush not at all at this intensity of grazing.

Parry danthonia, bearded and western wheatgrasses, Canby bluegrass, and prairie Junegrass were palatable but were not abundant enough to be considered among the major forage species. Of the forbs, purple milkvetch was the most palatable.

Utilization on heavily grazed areas was different from that on lightly grazed areas (Fig. 2). Arizona fescue and mountain muhly still received the most use and together furnished most of the forage. As on the lightly grazed range, mountain muhly was the outstanding species. It furnished 53 percent of the forage. However, the increased abundance of blue grama and more intensive grazing of it made it one of the important plants from the standpoint of forage produced—equally as important as Arizona fescue. Blue grama was used to about 25 percent, which was comparatively light use compared with the intensities at which mountain muhly and Arizona fescue were grazed. Both of these species were grazed in excess of 65 percent. Fringed sagebrush was grazed to about the same intensity as blue grama. It was more abundant in the composition and was grazed more than on the lightly grazed areas. Fringed sagebrush produced about 7 percent of the forage consumed. Little bluestem and sedges were grazed well, but were not abundant and, therefore, contributed only 5 to 7 percent to the forage.

The moderate rate of grazing (Fig. 3) is currently considered to be about proper utilization of pine-

TABLE 2.—UTILIZATION OF THE SIX MOST IMPORTANT PLANTS ON RANGE GRAZED AT THREE INTENSITIES, MANITOU EXPERIMENTAL FOREST

Species	Lightly grazed				Moderately grazed				Heavily grazed			
	Herbage use		Forage composition		Herbage use		Forage composition		Herbage use		Forage composition	
	1950	1952	1950	1952	1950	1952	1950	1952	1950	1952	1950	1952
	Percent											
Little bluestem	18	25	3.1	2.9	29	25	0.7	0.6	61	36	6.3	4.7
Blue grama	1	5	0.2	0.4	6	9	0.9	1.4	24	25	11.6	15.5
Arizona fescue	13	28	22.3	34.9	35	40	43.2	45.7	75	73	16.1	14.2
Mountain muhly	16	18	72.3	58.7	38	33	51.6	48.7	72	67	53.1	53.0
Sedge	8	17	2.1	3.1	22	19	3.4	3.4	46	38	7.0	6.0
Fringed sagebrush	0	0	0	0	3	3	0.2	0.2	30	28	5.9	6.6

FIG. 2.—On this area 70 percent of the herbage of native forage plants has been grazed. It is typical of the heavily grazed areas in this study.

FIG. 3.—Moderate use on pine-bunchgrass ranges, with approximately 40 percent utilization. This pasture is typical of moderately grazed areas used in this study.

bunchgrass range. In general, grazing of the various species under this rate differed from that on lightly grazed areas, principally in amount. Arizona fescue and mountain muhly were utilized 33 to 40 percent. These two species made up 90 to 95 percent of the forage, the same as they did on the lightly grazed areas. Blue grama and fringed sagebrush, which together made up less than 5 percent of the herbage consumed, were only lightly utilized. These species were grazed less than 10 percent.

Utilization by Seasons

Utilization of individual forage species varies with seasons as well as with the intensity of grazing (Fig. 4). On heavily grazed areas, 57 percent of the utilization of Arizona fescue was made during the first 48 days of the 117-day grazing period. During the remainder of the season, grazing of it continued, but at a reduced rate. On moderately grazed areas, 64 percent of the total use of Arizona fescue took place during the first 48 days. During the rest of the period the rate of use was much reduced. On areas grazed lightly, Arizona fescue was utilized at an almost uniform rate throughout the season.

Mountain muhly, in contrast to Arizona fescue, was grazed most heavily during the latter part of the grazing season. On heavily grazed areas only 24 percent of the utilization of mountain muhly was made during the first 48 days of grazing and 54 percent was during the last 41 days of grazing. The lighter the degree of use, the more grazing of mountain muhly tended to be concentrated in the later period. On the moderately grazed areas 66 percent of the grazing was made during the last 41 days, and on the lightly grazed areas 69 percent of the use was made during this period.

Little bluestem and sedge followed the same general trend as Arizona fescue on heavily and moderately grazed areas. They were grazed most during the first 48 days of the season. After that period the rate of use declined, especially on the areas grazed moderately. On lightly grazed areas little bluestem was grazed most during the middle of the summer.

Blue grama and fringed sagebrush were both relatively unpalatable as shown by the comparatively light utilization they received even on heavily grazed areas. There was less consistency than in other species in the way they were utilized under different grazing intensities. Blue grama on lightly and moderately grazed areas received most of its utilization during the middle of the summer. On heavily grazed areas it was most heavily grazed during the last of the period.

Discussion

Several factors seem to affect the time and degree of use each species received. Perhaps most important is the palatability of the plant to the cattle. Lightly grazed areas give a truer picture of palatability because there was sufficient herbage of all species available. On these areas Arizona fescue, mountain muhly, little bluestem, and sedge were highly palatable; blue grama only slightly palatable; and fringed sagebrush has little or no palatability.

The second factor affecting degree of use is the availability of species for grazing or perhaps availability of the desirable parts of the better species for grazing. The differences in utilization of the fescue, muhly, and sedge were all proportionately about the same for light, moderate, and heavy grazing. The relative differences in the use of little bluestem are somewhat similar but received a higher proportion of use on lightly grazed areas. However, use of blue grama and fringed sagebrush was markedly different. The proportionately heavy grazing of these species on heavily grazed areas indicates that the cattle turned to them for forage on heavily grazed areas. Since one-quarter or more of the herbage of the more palatable species was left both years on the heavily grazed pastures, the cattle apparently preferred the finer parts of the grama to the coarser parts of the more palatable plants. Another possibility is that they grazed it because of its availability.

The growth period of the plant influenced the utilization. Arizona fescue, little bluestem, and sedge grew early and they were grazed best at that time. On the other

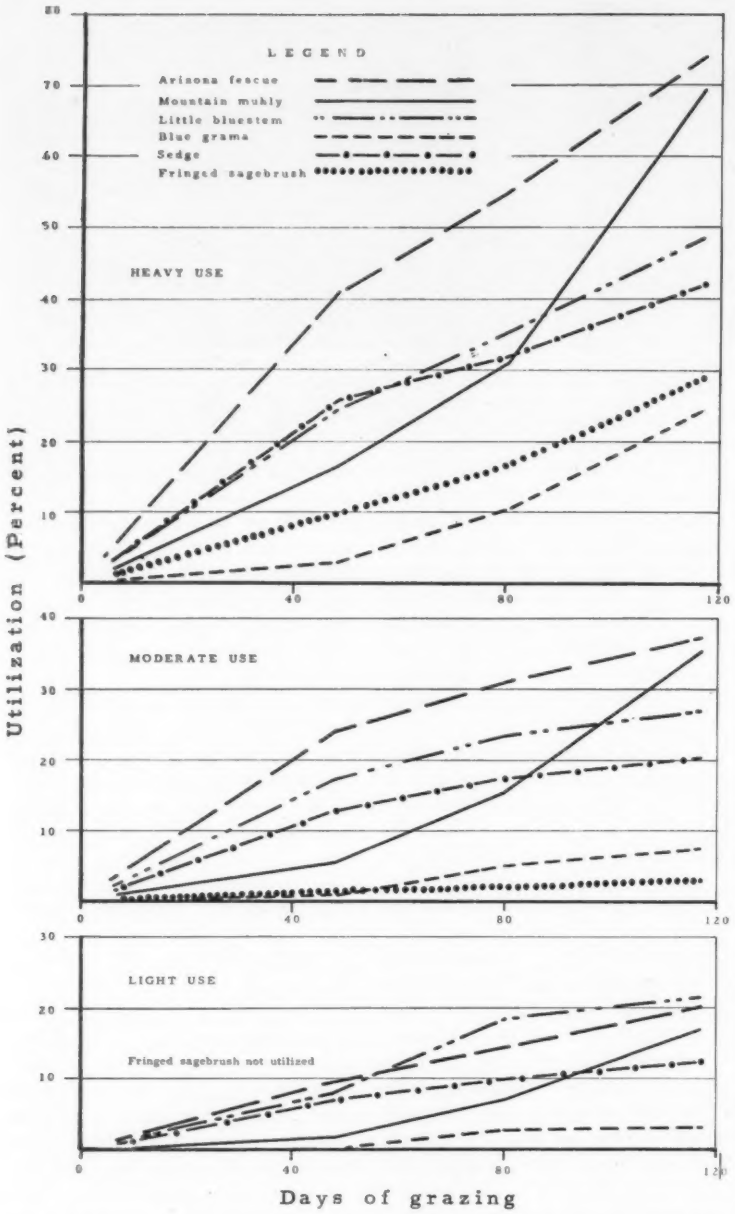

FIG. 4.—Seasonal use of major forage species on pine-bunchgrass ranges. 1950-1952.

hand, the period of rapid growth of mountain muhly and blue grama was later and these species were grazed later. The contrast between the fescue and the muhly is an example. By July 1, Arizona fescue in 1950 had made 90 percent of its leaf growth on moderately grazed areas. By that same date muhly had made only 60 percent of its leaf growth and its period of most rapid growth was in July. On July 1 cattle had made 72 percent of the total use of Arizona fescue that was to be made by the end of the grazing period, but only 29 percent of the total use of the mountain muhly.

The seasonal aspects of the palatability should be considered when determining the period to graze a range. Summer-long grazing at proper rates has been shown to have no serious effect on these bunchgrass ranges. A range that is most predominantly Arizona fescue could be used most effectively as late spring and early summer pasture, while one predominantly mountain muhly could be used most efficiently in late summer. In a rotation grazing system where midsummer shift to new pastures is used, the early use would throw the bulk of utilization on Arizona fescue, little bluestem, and sedge. At the same time mountain muhly, which had not made a considerable part of its growth, would be only lightly used. On the areas used later, the bulk of the utilization would be on mountain muhly. Arizona fescue, little bluestem, and sedge would receive the deferment.

The use received by blue grama is of particular interest in view of the value of blue grama on other range areas. In the shortgrass plains of eastern Colorado, blue grama is an important forage plant and furnishes most of the forage on cattle ranges. In the mountain areas it is relatively ungrazed if bunchgrasses are present, and it is not highly productive. On the Manitou Experimental Forest, herbage production on plots of almost pure blue grama averages about 30 pounds per acre in contrast to 650 to 750 pounds of bunchgrass types.

Arizona fescue and mountain muhly are the most productive grasses on the pine-bunchgrass ranges studied. They are highly palatable to cattle and carry the bulk of the grazing load. For these reasons maintenance of good vigorous stands of these species should be the basis of managing ranges where these grasses are important. On ranges grazed during the growing season, grazing that removes 30 to 40 percent of the herbage has been found to maintain both species. For Arizona fescue this means that the height of all plants at the end of the grazing period should average 5 to 6 inches. A sample measurement of plants on a range grazed in this manner

would reveal some plants ungrazed and some plants very closely grazed, but the majority of plants would have about 5 to 6 inches of ungrazed stubble at the end of the season. Corresponding plant heights for proper use of mountain muhly are 1½ to 2 inches at the end of the season. Since both little bluestem and sedge are utilized less than Arizona fescue or mountain muhly, they can be expected to maintain their productivity on ranges grazed in this manner. Utilization of this kind would be expected to maintain conditions similar to those found on the moderately grazed areas.

Dioryctria Cone Moth Attack as Related to Cone Rust of Slash Pine in North Florida

The southern pine cone rust disease has long been known to be destructive to first-year slash and longleaf pine cones. But it is now probable that the rust may also be indirectly responsible for additional heavy losses in second-year cones by providing a favorable breeding place for cone moth larvae, according to a recent preliminary study by forest entomologists at the Lake City Research Center.

During the past year a survey by E. R. Roth of this station indicated that the rust, *Cronartium strobilinum* (Arth.) Hedgc. & Hahn, was the direct cause of the loss of about 20 percent of the potential 1958 slash pine cone crop in north Florida and southeast Georgia. Hedgcock and Hahn, in their original description of this cone rust, mention the fact that numerous nectar-loving insects were attracted to the diseased cones in the spring and were observed feeding on the pycnial exudations. *Dioryctria abietella* (D. & S.) was the only insect which was specifically identified and found associated commonly with infected cones.[1]

TABLE 1. — INCIDENCE OF BRANCHLETS BEARING SECOND-YEAR CONE CLUSTERS ATTACKED BY DIORCYTRIA CONE MOTHS — JUNE 1957

Tree	Branchlets with diseased first-year cone clusters	Branchlets with healthy first-year cone clusters
	Percent	
A	100	31
B	86	9
C	89	7
D	100	18
Average	89[1]	13[2]

[1]Based on a total of 74 randomly selected branchlets.
[2]Based on a total of 116 randomly selected branchlets.

Field observations at Lake City have disclosed that rust-infected cones invariably supported populations of larvae of two cone moths, *Dioryctria abietella* (D. & S.) and *D. amatella* (Hulst), as early as April. By this time the diseased cones had become swollen and were covered with bright yellow-orange spores, and appeared to provide an ideal habitat for the cone-destroying insects.

Two months later, in mid-June, attacks on second-year cones by the Dioryctria cone moth larvae became noticeable in the field. It was then discovered that insect attacks on these second-year cones were most likely to occur on branchlets where there were first-year cones that had been hit by rust earlier the same season. Apparently the insect populations had built up in the rusted first-year cones, and had then moved down the branch to attack the maturing second-year cones.

Second-year cones on branchlets having healthy, rust-free, first-year cones showed a low incidence of moth infestation.

Data are summarized in Table 1 from nearly 200 branchlets on four open-grown slash pines, averaging 35 feet in height and 8 inches d.b.h.

From our observations it appears that rust-infected slash pine conelets are a highly attractive food for Dioryctria larvae in the spring. The data also demonstrate the vulnerability of second-year cones on branches with diseased conelets. However, it should not be concluded that these moths required diseased cones either to survive or to maintain heavy populations, since they also attack branch tips and tree stems.

Further research is needed to evaluate total cone moth damage to cone crops on trees with both high and low cone-rust incidence. Data thus far suggest that controlling the cone rust may also substantially reduce the damage to second-year cones by insects.

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[1]Hedgcock, G. G., and G. G. Hahn. Two important pine cone rusts and their new cronartial stages. Part I. *Cronartium strobilinum* (Arthur) Hedgcock and Hahn, Phytopathology 12(13):109-116. 1922.

Results of Pole Blight Damage Surveys in the Western White Pine Type

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POLE BLIGHT, a serious disease of undetermined cause, has been observed in pole-sized stands of the western white pine (*Pinus monticola* Dougl.) type in western Montana, northern Idaho, and eastern Washington for approximately 25 years (*3*). An account of the disease and its symptoms has been given in previous publications (*1, 3, 4*). The disease is present throughout the commercial range of western white pine in the Inland Empire except in the southern part of the white pine area drained by the Clearwater River. It also extends into British Columbia. Distribution surveys show that in the Inland Empire approximately 95,000 acres of the 750,000 acres of white pine pole-sized stands are moderately to severely damaged by this disease, and that an additional acreage shows light, scattered damage (*2*).

Pole blight threatens the successful perpetuation of western white pine throughout much of its range. The disease is especially important because it attacks primarily the dominant and most vigorous trees in 40- to 100-year-old stands. The acreage of this class is already insufficient for future harvests after existing mature stands have been depleted. Although the seriousness of the disease has been generally recognized, very little effort to evaluate the extent of damage was made until damage surveys were started in 1954. These surveys, to determine disease incidence and resulting tree mortality and their effect on the stand, were designed to appraise more completely the seriousness of the pole blight problem.

Survey Methods

Sixteen major diseased stands were sampled, four stands in western Montana and four stands in each of the Kanisku, St. Joe, and Coeur d'Alene National Forests in northern Idaho. Two affected stands that had shown recognizable pole blight symptoms for the longest period of time and two for an intermediate period of time were selected for sampling in each forested area. Each of the 16 diseased stands was divided into four blocks. Two strips per block were run starting at one side of the block and extending toward the periphery of the diseased stand. Five temporary 1/10 acre circular plots were located along each strip. The starting points of the strips and the location of plots along the strips were randomized. This sampling method provided 10 plots per block and 40 plots for each diseased stand.

In addition to those in the major diseased stands, sample plots were located in 16 small recently affected stands that had shown recognizable pole blight symptoms for approximately 5 years or less. Five of these stands were located in the St. Joe and five in the Coeur d'Alene National Forest; three stands were in the Kanisku National Forest, and three others in western Montana. Two to 10 plots were taken in each stand.

Hereafter, the approximate periods of time that the sampled stands had been diseased will be referred to as follows:

Recent—stands affected 5 years or less.

Intermediate — stands affected from 6 to 13 years, inclusive.

Old—stands affected 14 years or more.

On each plot all living and recently dead standing trees 0.6 inch d.b.h. and over were tallied by 2-inch diameter classes and by the two broad crown classes — dominant and overtopped. Each white pine tallied was classified as healthy, pole blight diseased, or pole blight dead. The only mortality recorded was that caused by pole blight as determined from dead standing trees with bark and limbs more or less intact and recent windthrows. Thus, fairly recent pole blight mortality was obtained but not the total accumulated mortality since invasion by the disease.

Survey Results

The survey methods previously described resulted in the establishment of a total of 724 1/10-acre plots in recent, intermediate, and old diseased areas. Basal area of damaged trees, including diseased and recently dead trees, expressed as a percentage of the total white pine basal area, is shown in Figure 1 for the periods of time the disease had been prevalent. The 16 stands recently affected were grouped by forest areas. The average basal area of white pine damaged, including diseased and dead trees, for the four areas was 28 percent. The eight stands affected for an intermediate period of time had a basal area of damaged trees ranging from 35 to 58 percent with an average of 45 percent. Comparable values for the eight oldest affected stands were 45 to 81 percent with an average of 68 percent.

Figure 1 shows that the percentage of basal area of diseased trees was nearly equal in all stands, irrespective of stand location or time of disease origin. Mortality did not become appreciable until recognizable symptoms of the disease had been present in the stands for 5 years or more. Trees representing only 6 percent of the white pine basal area were dead in the recently affected stands. Mortality was 17 percent in the stands affected for an intermidate period, and 44 percent in the stands affected longest. The percentage of basal area in diseased trees exceeded that in blight-killed trees in all

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stands affected for recent and intermediate periods of time. In the stands affected for the longest period the opposite occurred. Stands diseased for equal lengths of time had a wide variation in total damage. This variation was largely the result of differences in the amount of mortality.

Damage, indicated as a percentage of the total stand basal area (all species 0.6 inch d. b. h. and over), followed the same pattern as damage to the white pine component; i.e., the highest total damage and pole blight mortality occurred in the oldest diseased stands and the lowest occurred in the recently diseased stands. Total stand damage averaged 13 percent in the recently affected stands, 18 percent in the stands affected for an intermediate period, and 24 percent in the stands affected longest.

Pole blight may nearly have run its course in several of the oldest affected stands; namely, the Bull River, Bull Lake, Cedar Canyon, and Canyon Creek stands. Twenty years ago these four stands probably each contained about 40 percent white pine. Each of these stands will have less than 8 percent of its basal area composed of white pine after the currently diseased trees die and if the remaining heatlhy trees do not become blighted.

Further evidence of the severity of pole blight damage in stands is shown by the percentage of sample plots in the various basal area damage classes. Three-fourths of the 724 plots taken in diseased stands had 25 percent or more of the white pine damaged, based on total white pine basal area, and about one-half of the plots had damage of more than 50 percent. Based on total stand basal area, 32 percent of these plots had damage of more than 25 percent, while 5 percent had suffered more than 50 percent damage. Disease incidence and mortality were more severe in stands where the disease had been prevalent longest, but severe damage also occurred in stands where the disease had appeared more recently. Losses were scattered throughout the stands, becoming more severe and more uniformly distributed with increase in time.

Trees in the larger diameter classes are more seriously affected by pole blight than the smaller ones. Sixty-three percent of the white pine stems equal to 63 percent of the white pine basal area in trees more than 9 inches d.b.h. were affected by pole blight, compared to 18 percent of the stems and 30 percent of the basal area in trees 9 inches in diameter or less. Trees in the dominant and codominant crown classes are more seriously affected than those in the lower crown classes. Fifty-nine percent of the stems, consisting of 61 percent of the basal area of dominant and codominant white pines, were affected, while only 4 percent of the stems, representing 7 percent of the basal area of intermediate and overtopped trees, were affected by pole blight.

The average basal-area stocking, including diseased and recently dead trees, for all periods of time

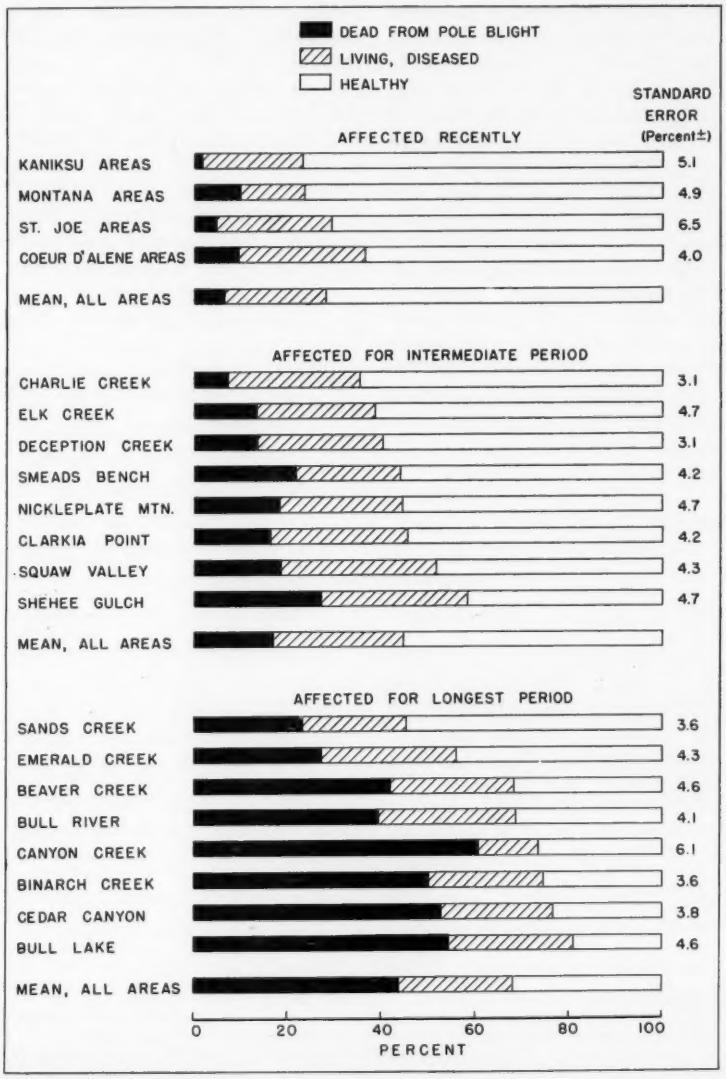

FIG. 1—Percentage of basal area in white pine trees that are dead, diseased, and healthy according to the length of time pole blight has been present in the respective stands. The standard error is for the total white pine diseased and dead

diseased, was 83 percent of normal at the time of sampling. After basal area of damaged trees was subtracted from the total, the average stocking was reduced to 68 percent of normal, a reduction of 15 percent (Table 1). This reduction was actually 11 percent in the recently affected stands, 15 percent in the stands affected for an intermediate period, and 18 percent in the stands affected longest. These figures do not account for losses in basal area stocking due to total accumulated mortality since origin of the disease, because the dead trees tallied represented only the mortality during the previous few years. Trees once diseased rarely recover, and it is estimated that all trees diseased at the time of sampling will be dead within 10 years. Therefore, an average reduction of 15 percent in basal area stocking by pole blight represents a loss over a period estimated to be about 15 years. If this estimate is reasonable, affected stands are being reduced in basal-area stocking at the rate of about 1 percent annually.

Estimated annual losses from pole blight induced mortality and reduced growth are presented in Table 2. The 724 sample plots contained a total volume of 211,000 cubic feet of white pine; 59,000 feet in live blighted trees, 56,000 feet in blight-killed trees, and 96,000 feet in healthy trees. Assuming that the dead standing trees and recent windthrows with bark and limbs more or less intact represented mortality during the previous 5 years, the average annual mortality was 152 cubic feet per acre on an estimated 102,000 acres or about 15½ million cubic feet for the entire acreage affected. Mortality in old affected stands was about 2.5 times that in stands affected for an intermediate period and about 5 times that in recently affected stands. Although losses from mortality increased at a progressive rate the longer a stand had been diseased, loss of growth in living diseased trees remained about constant. Annual growth loss in living diseased trees averaged 22 cubic feet per acre based on an estimated increment reduction of 45 percent in blighted as compared to nonblighted trees. This growth loss when applied to the entire acreage affected was about 2¼ million cubic feet. Thus the total estimated annual loss from pole blight, including mortality and growth reduction, was 174 cubic feet per acre or about 17¾ million cubic feet for all the affected acreage. These figures do not include the loss resulting from a delay in stocking. On the other hand, they do not account for increased growth of associated species or salvage of dead and dying trees, both of which might compensate for part of the losses.

TABLE 1.—REDUCTION IN NORMALITY OF THE TOTAL STAND BASAL AREA PER ACRE CAUSED BY POLE BLIGHT FOR RECENT, INTERMEDIATE, AND OLD DISEASED STANDS

	Normal[1] basal area stocking	Basal area stocking of total stand[2] Including pole blight damage		Reduced by pole blight damage		Reduction in normality caused by pole blight
		Actual stocking	Normality	Actual stocking	Normality	
	Sq. ft.	*Sq. ft.*	*Percent*	*Sq. ft.*	*Percent*	*Percent*
Recent	239	209	87	182	76	11
Intermediate	224	181	81	148	66	15
Old	254	204	80	157	62	18
All diseased stands	239	198	83	162	68	15

[1]Values taken from Table 5, U.S.D.A. Tech Bul. No. 323 using the averages and average site indices of the stands at the time of sampling.
[2]All species 0.6 inch d.b.h. and over.

TABLE 2.—ESTIMATED ANNUAL CUBIC-FOOT VOLUME LOSSES BY POLE BLIGHT BASED ON AREA SURVEYED AS APPLIED TO THE ENTIRE AREA AFFECTED

Diseased stands	Area affected	Annual mortality loss Per acre	Annual mortality loss Total	Annual growth loss Per acre	Annual growth loss Total	Total annual loss Per acre	Total annual loss Total
	Acres	*Cu. ft.*	*M. cu. ft.*	*Cu. ft.*	*M. cu. ft.*	*Cu. ft.*	*M. cu. ft.*
Recent	13,000	46.5	604	23.9	311	70.4	915
Intermediate	46,000	94.9	4,365	22.4	1,030	117.3	5,395
Old	43,000	245.0	10,535	21.0	903	266.0	11,438
All diseased stands	102,000	152.0	15,504	22.0	2,244	174.0	17,748

Summary and Conclusions

A sample-plot survey to determine the damage caused by the pole blight disease and its effect on the stand was made in the western white pine type. The stands sampled were distributed throughout the known range of the disease in the Inland Empire and were grouped into three time periods depending on how long the disease had been present.

The basal area of damaged white pine, including diseased and recently dead trees, increased with the length of time that recognizable symptoms of the disease had been present. Damage was appreciable even in the most recently affected stands. In all diseased stands combined, about one-half of the white pine basal area and about one-fifth of the total stand basal area were in blighted trees or trees that had died from blight during the previous few years. Additional damage that could not be calculated accurately was the total accumulated mortality that had occurred since origin of the disease.

Other effects of the disease on the stand have been a reduction in stocking, size class, dominance, and composition of the most valuable species.

The results of this survey confirm that pole blight is a serious problem in the western white pine type. The past and current level of damage, as determined from the survey, has caused and is continuing to cause a serious reduction in productivity. Pole blight damage in many affected stands greatly exceeds growth and thus under current conditions will eliminate white pine as a commercially important species in these stands in a relatively short time.

This survey provides no definite indication of what the future progress of the disease will be. Whether the annual rate of disease progress will be about the same from year to year or whether it will spread and intensify at a decreasing or increasing rate is unknown. The survey gives no evidence that the course of development of the disease in recently affected areas will be the same as that which has occurred in the oldest diseased areas.

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Longleaf Pine Establishment and First-Year Survival Unaffected by Moderate Grazing

In a study in south Alabama, moderate grazing by cattle had little effect on the establishment and first-year survival of longleaf pine (*Pinus palustris* Mill.).

Eighty pairs of four-milacre plots were established in 1955 on regeneration areas scattered throughout a 3,000-acre fenced forest range on the Escambia Experimental Forest. One plot of each pair was fenced six weeks before seedfall. Seed fell and germinated in the late autumn of 1955.

Ordinary range cattle were on the tract throughout 1956, but grazing was not heavy. The average was 50 cows, or one for 60 acres. Forage utilization averaged 22 percent. Range conditions and grazing practices were typical of those in a large part of the longleaf pine region.

The grazing had a negligible effect on seedling establishment and first-year survival. Average milacre stocking of newly established longleaf seedlings in March 1956 was 71.2 percent on fenced plots and 72.8 percent on unfenced plots. Milacre stocking of the 1-year-old seedlings in January 1957 was 61.9 percent on fenced plots and 59.4 percent on unfenced plots.

These results suggest that, with moderate to light grazing, cattle need not be excluded from regeneration areas during the establishment and first growing season of longleaf pine. There is some indication that longleaf pine regeneration may be adversely affected by sustained heavy grazing before seedfall. Grazing damage possibly may occur during the second and third years after germination, or deferred effects of early grazing may show up later. These phases of the problem are being studied.

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National Outdoor Recreation Review Launched

Under provisions of the recently enacted Public Law 85-470 a commission will be established to study the outdoor recreational facilities of the U. S., including those possibilities on private land, and to make recommendations of goals for the years 1976 and 2000.

Senate members of the Commission have been named. They are: Senators Anderson of New Mexico, Neuberger of Oregon, Watkins of Utah, and Barrett of Wyoming. The law provides for the appointment of a 15-member commission, four from the Senate, four from the House Committee on Interior and Insular Affairs, and seven "eitizens, known to be informed and concerned with the preservation and development of outdoor recreation resources and opportunities, and experienced in resource conservation planning for multiple resources uses, who shall be appointed by the President, and one of whom shall be designated as chairman by the President."

The commission will be servieed by an advisory council which will consist of liaison officers from each federal agency concerned with outdoor recreation, and 25 members appointed by the commission who "shall be representative of the various major geographical areas and citizen interests. . . ."

In addition the commission is authorized to employ staff members. Total costs are ceilinged at $2,500,000. Purpose is to report to the President and to Congress by September 1, 1961 on "trends in population, leisure, transportation, and other factors" and to determine "the amount, kind, quality, and location of such outdoor recreation resources and opportunities as will be required by the year 1976 and the year 2000," and to "recommend what policies and what programs be initiated, at each level of government and by private organizations and other citizen groups and interests, to meet such future requirements."

The act defines outdoor recreation facilities to mean: "the land and water areas and associated resources of such areas in the United States, its Territories, and possessions which provide or may in the future provide opportunities for outdoor recreation, irrespective of ownership."

Thinning Improves Development of Young Stands of Ponderosa Pine in the Black Hills

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NATURAL REGENERATION of ponderosa pine (*Pinus ponderosa* Laws.) is easily obtained in the Black Hills on all but the poorest sites. With a seed source nearby, burns and other deforested areas may restock with dense stands of seedlings. If left to develop through natural thinning, these stands become crowded sapling thickets (Fig. 1). Height growth is retarded; diameter growth almost ceases. Snow and wind may bend many of the slender stems into an almost impenetrable tangle. In such stands, natural thinning and subsequent development to commercial size is extremely slow; hence, artificial thinning is needed.

Few guides are available for thinning ponderosa pine in the Black Hills. In an unpublished report, Bates suggested thinning 20-year-old stands to 1,200 trees per acre.[2] He concluded that, "From every standpoint, except the possibility of financial returns, the age 20-25 years suggests itself as the best for thinning." Stuart and Roeser recommended thinning trees less than 6 inches d.b.h. to a spacing equivalent to about 900 trees per acre (*5*). That was greater than the number of trees usually left at the time their study was made. They believed that closer spacing would result in (1) earlier natural pruning, (2) greater wood production per acre, and (3) an allowance for mortality due to snow bend and porcupine injury.

A study was begun in 1931 to determine desirable levels of reserve stocking for dense stands of young pine. Twelve plots were established by personnel of the Black Hills National Forest under the direction of J. Roeser, Jr. Results from the remeasurement of these plots in April 1956 are reported here.

Study Area

The study area near Nemo, South Dakota is believed to be representative of about one-third of the commercial forest land of the Black Hills. Steep rounded hills, gently sloping benches, and narrow valleys are characteristic topographic features. Elevations range from 4,500 to 5,100 feet. Soils are shallow, rocky sandy loams derived from slates and schists. Soil depth is variable on slopes; outcropping of bedrock is frequent. Average annual precipitation is about 20 inches, with nearly 60 percent falling during the period May 1 to September 30.

Densely stocked 28- and 40-year-old stands and an overstocked 55-year-old stand were selected for study.

Site quality is average for the two younger stands and better than average for the older stand. By the Black Hills classification (*2*), the older stand is on an Area 1 site and the two younger stands are on Area 2 sites. These site quality classes correspond approximately to classes V and VI, as defined by Meyer (*3*).

Methods

Twelve plots of ¼ or ½ acre each were established to test three degrees of thinning in each of the three age classes. One block of four plots was placed in each stand selected for study. Three plots of each block were thinned and one plot was left unthinned (Table 1).

In the plots, the best trees were left at the desired spacings. The poorest dominant and codominant as well as most of the intermediate and overtopped pines were cut. The better intermediates were occasionally left to obtain the spacing de-

[1]Central headquarters at Fort Collins in cooperation with Colorado State University. Research reported in this article was conducted by the station's field unit at Rapid City, S. Dak., in cooperation with the South Dakota School of Mines and Technology.

[2]Bates, C. G. Effects of thinnings in Black Hills yellow pine, progress report for 1919. Rocky Mountain Forest and Range Experiment Station. Unpublished. 1919.

TABLE 1.—PLOTS BEFORE THINNING AND SPACINGS TESTED

Average age when thinned	Spacing used	Plot size	Entire stand before thinning, per acre basis					
			Trees	Average d.b.h.	Average height[1]	Basal area	Cubic feet	Pulpwood
Years	*Feet*	*Acres*	*Number*	*Inches*	*Feet*	*Square feet*	*Cubic feet*	*Cords*
28	10 x 10	0.25	12,468	1.3	11	120.89	732.42	0
28	8 x 8	0.25	19,632	1.0	10	113.25	563.88	0
28	6.1 x 6.1	0.25	18,420	1.0	10	104.10	603.16	0
28	Unthinned	0.25	13,676	1.3	12	127.98	820.10	0
40	12.5 x 12.5	0.5	3,518	2.9	20	160.44	1,573.34	7.3
40	10 x 10	0.5	5,722	2.0	13	127.51	932.87	2.0
40	7.6 x 7.6	0.5	7,980	1.9	14	151.71	1,082.35	1.6
40	Unthinned	0.25	5,440	2.3	19	151.50	1,273.84	0.7
55	14.6 x 14.6	0.5	856	4.9	30	112.38	1,640.11	17.5
55	11.3 x 11.3	0.5	948	4.9	30	125.31	1,773.77	17.5
55	9.4 x 9.4	0.5	1,016	5.0	33	136.50	2,176.20	22.7
55	Unthinned	0.5	932	5.1	32	130.72	2,097.89	20.1

[1]Tree of average basal area.

sired. All quaking aspen (*Populus tremuloides* Michx.), white spruce (*Picea glauca* (Moench) Voss), and paper birch (*Betula papyrifera* Marsh) were cut. There were fewer than 100 small trees of these species on all plots. The 55-year-old stand was thinned in October 1931; the 28- and 40-year-old stands, in October 1933.

Measurements before thinning, after thinning, and in 1956 were made to about the same standards. The diameter of every tree was measured to the nearest 0.1 inch. Total heights after thinning were measured to the nearest foot on 10 to 20 percent of the trees on each plot. In 1956, total heights were measured on 20 to 40 percent of the trees. At the time of thinning, crown class was determined for only trees of the 55-year-old stand. In 1956, crown class was recorded for all trees on each plot.

Basal areas and cubic-foot volumes were computed by 0.1-inch d.b.h. classes for the *entire* stand on each plot. Height-diameter curves representing conditions at time of thinning and in 1956 were drawn for each plot. Past and present local volume tables were derived for each plot by the use of these curves and a standard volume table for total cubic feet (*4*).

Pulpwood volumes (4-inch top diameter) in trees 6.0 inches d.b.h. and larger were expressed in rough standard cords of 8-foot bolts. Volumes in trees smaller than 13 inches d.b.h. were determined from a table of cords per tree by 1-inch diameter classes. Pulpwood volumes in larger trees were computed from board-foot volume by using a converting factor of 275 board feet per cord.

Increases in basal area and volume were expressed as net periodic increment. These values are differences between total basal area (or volume) of live trees in 1956 and total basal area (or volume) of live trees at time of thinning. Differences include ingrowth, where applicable. No deductions have been made for defect.

One-half of the plot thinned to 10x10 feet in the 40-year-old stand was accidentally rethinned within 5 years after plot establishment. In the computations, it was assumed that the 27 trees accidentally cut were removed when the plot was thinned in 1933. Results could not be based on the half-plot not rethinned, because it is below average site quality for the plot and the block.

Results

Number of trees. — Thinning effectively reduced subsequent mortality in all three stands (Table 2). Reduction in number of trees has been relatively small on thinned plots, with no apparent relation between mortality and stand density. In contrast, approximately one-half of the trees died on unthinned plots of the 28- and 40-year-old stands. These plots still have 4 to 6 times as many trees as lightly thinned plots. Forty-one percent of the trees on the unthinned plot of the 55-year-old stand died after plot establishment. Losses in all stands were due almost entirely to suppression of trees 4 inches in diameter or smaller.

Diameter.—Thinning stimulated diameter growth, especially in the two younger stands. Growth of the 100 largest trees per acre increased with intensity of thinning in each stand (Table 3). Average diameter increase of all trees alive in 1956 shows this same relation in the two younger stands (Table 2). However, there was no relationship between average diameter increase and stand density in the 55-year-old stand.

Height.—Average periodic height growth of dominant and codominant trees increased with intensity of thinning in the two younger stands (Table 2). On heavily thinned plots, these increases were almost twice as great as those on unthinned plots. Values reported are based on measurement of the same trees in 1933 and 1956. In the 55-year-old stand, several dominant and codominant trees measured in 1931 are dead or damaged by porcupines. There are now too few measured dominants and codominants for computation of height growth.

Basal area.—Periodic increment

TABLE 2.—PLOTS AFTER THINNING AND GROWTH TO 1956, PER ACRE

Average age when thinned	Spacing used	Trees		Average d.b.h.		Periodic height growth[2]	Basal area		Total cubic feet		Pulpwood	
		After thinning	1956	After thinning	Average increase[1]		After thinning	Periodic increment[1]	After thinning	Periodic increment[1]	After thinning	Periodic increment[1]
Years	*Feet*	*Number*		*Inches*		*Feet*	*Square feet*		*Cubic feet*		*Standard cords*	
28	10 x 10	432	420	2.1	3.8	14.4	10.77	70.24	63.85	806.54	0	11.2
28	8 x 8	680	660	1.9	3.1	13.7	13.24	77.00	65.50	830.94	0	5.3
28	6.1 x 6.1	1,176	1,172	1.7	2.2	11.9	19.25	80.85	109.66	786.44	0	1.0
28	Unthinned	13,676	6,784	1.3	0.9	7.4	127.98	55.65	820.10	795.80	0	1.5
40	12.5 x 12.5	280	248	3.7	3.7	11.5	21.39	52.90	209.59	946.81	0.4	15.1
40	10 x 10	[3]378	372	3.3	3.3	10.0	22.63	64.94	183.37	1,011.33	0.2	15.3
40	7.6 x 7.6	748	716	2.8	2.4	9.6	32.11	75.55	246.83	1,084.72	0.4	10.5
40	Unthinned	5,440	2,764	2.3	1.0	6.5	151.50	17.33	1,273.84	655.58	0.7	4.5
55	14.6 x 14.6	204	192	7.0	2.3	.....	54.05	37.47	852.88	980.47	10.2	12.3
55	11.3 x 11.3	340	316	6.6	1.6	.....	79.58	37.32	1,193.01	983.77	13.4	12.0
55	9.4 x 9.4	490	412	6.2	1.7	.....	103.09	35.87	1,708.72	988.71	19.0	11.1
55	Unthinned	932	548	5.1	2.0	.....	130.72	21.66	2,097.89	831.08	20.1	11.1

[1]Live stand in 1956 minus live stand after thinning. Period: 22 growing seasons for 28- and 40-year-old stands, 24 growing seasons for 55-year-old stand.
[2]Dominant and codominant trees. Period: 22 growing seasons for 28-year-old stand, 17 years for 40-year-old stand.
[3]Accidentally rethinned.

of basal area was greater on thinned than on unthinned plots (Table 2). In the 28- and 40-year-old stands, basal area growth increased with stand density on thinned plots. All thinned plots of the 55-year-old stand produced about the same basal area increment.

Cubic-foot volume. — Thinning did not reduce the periodic increment in cubic-foot volume (Table 2). Growth did not differ materially among thinned plots of each stand. However, unthinned plots of the 40- and 55-year-old stands produced less cubic-foot volume than did the thinned plots. Because there was no replication it is not possible to determine whether these differences are real.

Total cubic-foot volume in 1956 was related to stand density for all three stands, the greater the density the greater the volume.

Pulpwood volume.—The increased diameter and height growth that accompanied the heavier thinnings were matched by corresponding increases in pulpwood volume. Plots thinned to the two widest spacings in the 28- and 40-year-old stands produced far more pulpwood than unthinned plots (Table 2). In the 55-year-old stand, growth of pulpwood volume was about equal on all plots.

In the 55-year-old stand, present total volumes of pulpwood increase with stand density. Many of the trees of this stand were of, or near, pulpwood size at time of thinning. Present pulpwood volume is therefore related to present number of trees. Total production (present volume plus volume cut) was about equal on all plots—approximately 30 cords.

TABLE 3.—DIAMETER GROWTH OF THE 100 LARGEST TREES PER ACRE

Average age when thinned	Spacing used	Diameter breast high		
		After thinning	1956	Periodic increase[1]
Years	*Feet*	*Inches*	*Inches*	*Inches*
28	10 x 10	2.7	6.7	4.0
28	8 x 8	2.6	6.2	3.6
28	6.1 x 6.1	2.9	5.3	2.4
28	Unthinned	4.2	5.4	1.2
40	12.5 x 12.5	4.7	8.7	4.0
[2]40	10 x 10	4.5	7.7	3.2
40	7.6 x 7.6	4.3	7.3	3.0
40	Unthinned	5.4	6.8	1.4
55	14.6 x 14.6	8.7	11.2	2.5
55	11.3 x 11.3	8.8	10.8	2.0
55	9.4 x 9.4	9.3	11.0	1.7
55	Unthinned	9.6	11.2	1.6

[1]Period: 22 growing seasons for 28- and 40-year-old stands, 24 for 55-year-old stands.

[2]Trees on the half-plot not accidentally rethinned.

Discussion and Conclusions

Thinnings are made to put future growth of a stand on the best trees available and to maximize the yield for the rotation. Precommercial thinnings have the additional objective of shortening the time until income can be obtained from the stand. The results of this study show that precommercial thinnings are necessary in dense stands of ponderosa pine in the Black Hills. Further, thinnings must be heavier than previously recommended or the objectives of thinning will not be fully achieved. This is supported by the recommendation that ponderosa pine in the Southwest be thinned to 600 trees per acre when d.b.h. is less than 3 inches (*1*).

Fewer trees should be left in the reserve stand than the numbers

FIG. 1.—Unthinned plot of the 28-year-old stand in 1933. There were 13,676 trees per acre with an average diameter of 1.3 inches. There has been little change in the appearance of this plot since 1933.

FIG. 2.—With 8x8-foot spacing the 28-year-old stand now (1956) has 660 trees per acre with an average diameter of 5.0 inches. This spacing has not resulted in coarse crowns or limby boles.

suggested by Bates or Stuart and Roeser. Within rather wide limits, as shown in Table 2, this will not reduce periodic growth. Equality of growth in cubic feet in each block indicates full utilization of the site with all spacings tested. None of these spacings resulted in coarse crowns or limby boles (Fig. 2).

The wider spacings in each block best met the objectives of thinning. In the 28- and 40-year-old stands with wider spacing this is indicated by the greater growth of individual trees and pulpwood volume. Although the lightest thinnings resulted in greatest basal area increment, some of the apparent advantage will be lost through death by suppression or a second precommercial thinning. In the 55-year-old stand, all plots responded with about the same growth. With the wider spacings, however, growth was concentrated on fewer and better trees.

The best spacing for any stand will depend on local management objectives. Where sawlogs are the principal product and only one precommercial thinning is to be made, the results of this study suggest a reserve stand of about 550 trees per acre when average d.b.h. is 1 inch, 425 trees per acre when average d.b.h. is 2 to 3 inches, and 300 trees per acre when average d.b.h. is 5 inches. The data are inadequate to assure that these are the best spacings, but they are believed to be close approximations.

These densities are a compromise of the wider spacings of each block to concentrate growth on the best trees, provide volume for intermediate cuttings, reduce the time for the younger stands to reach merchantable size, and allow for losses from porcupines and other agencies. Stands as young as these should not be thinned to the lowest density permitting full utilization of the site. Otherwise, the number of well-formed and disease-free trees may subsequently be reduced below that desirable and limit the flexibility of future management. Girdling, spike-top, or forking caused by porcupines (*Erethizon epixanthum* Brandt) was found on 9 percent of all trees still alive in 1956. In the 40-year-old stand, 17 percent of the live trees were damaged.

Before thinning stands similar to the 55-year-old stand, the distribution of numbers of trees by diameter classes should be determined. It may be desirable to defer thinning if many trees to be cut are just below merchantable size. Delay would be possible if the stand is not greatly overstocked and if post and pulpwood markets are available.

Summary

In 1931 and 1933 J. Roeser, Jr. began a study to determine suitable spacings for thinning ponderosa pine in the Black Hills. Dense 28- and 40-year-old stands and a slightly overstocked 55-year-old stand were selected for study. Three plots thinned to different spacings and one unthinned plot were established in each stand. These plots were remeasured in 1956.

The 28- and 40-year-old stands responded favorably to precommercial thinning. Growth in diameter, height, basal area, and pulpwood volume was greater on thinned than on unthinned plots. Despite death of about half the trees on the unthinned plots, they are still too heavily stocked for satisfactory stand development.

Growth after thinning was about the same for all spacings tested in the 55-year-old stand. The heaviest thinning, however, concentrated wood growth on the best trees available.

Where sawlogs are to be produced with one precommercial thinning, the results suggest thinning to about 550 trees per acre when average d.b.h. is 1 inch, 425 trees when average d.b.h. is 2 to 3 inches, and 300 trees when average d.b.h. is 5 inches. The data are inadequate to determine the one best spacing for each stand diameter class.

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Treatment of Douglas-Fir Seed to Reduce Loss to Rodents

James Dick, J. M. Finnis, Lee O. Hunt, Nelson B. Kverno[1]

A METHOD OF treating Douglas-fir seed to reduce losses to rodents was sufficiently developed by fall 1955 to warrant forest seeding on a broad scale.[2] It involved coating the seed with an adhesive, a rodenticide, and a coloring agent, the last to identify treated seed and to deter birds from feeding on seed. The adhesive was a mixture of methocel and rhoplex; the rodenticide was endrin; and the coloring agent was aluminum flake. In 1956, the U. S. Fish and Wildlife Service Research Laboratory recommended that Dow Latex 512-R be substituted for the methocel-rhoplex and Arasan 75, a fungicide with rodent repellent properties, be included in the coating.[3] A field test of the effectiveness of these modifications was undertaken by three cooperators in different portions of the Douglas-Fir Region.

[1]Research forester, Weyerhaeuser Timber Company; assistant forester, Research Division, British Columbia Forest Service; forester, U. S. Bureau of Land Management; and biologist, Denver Research Laboratory, U. S. Fish and Wildlife Service, respectively.

[2]Anonymous. Seed treatment methods. U. S. Fish and Wildlife Service, Wildlife Research Laboratory. 1 p. mimeog. 1955.

TABLE 1.—FIRST-SEASON SEEDLING STAND RESULTING FROM BROADCASTING ENDRIN-COATED DOUGLAS-FIR SEED AT ONE POUND PER ACRE[1]

Region	Methocel-rhoplex				Dow Latex 512-R			
	Arasan 75 added		No additive		Arasan 75 added		No additive	
	Total seedlings	Stocked quarter-milacres	Total seedlings	Stocked quarter-milacres	Total seedlings	Stocked quarter-milacres	Total seedlings	Stocked quarter-milacres
	Number							
British Columbia	10	7	13	9	3	2	1	1
	19	12	28	19	32	18	13	10
	37	14	12	10	54	18	6	6
Washington	78	32	40	21	37	19	20	16
	51	25	34	19	51	21	26	14
	25	15	5	5	32	16	32	18
Oregon	18	15	29	17	23	19	17	15
	12	11	56	25	15	11	12	10
	14	11	21	11	45	21	20	13
All	264	142	238	136	292	145	147	103

[1]Based on examination of 40 quarter-milacres, or 0.01-acre area per plot.

TABLE 2.—ANALYSIS OF VARIANCE OF FIRST-SEASON SEEDLING STAND RESULTING FROM BROADCASTING ENDRIN-COATED DOUGLAS-FIR SEED AT ONE-POUND-PER-ACRE[1]

Variation due to	Degrees of freedom	Mean square for	
		Number of seedlings per plot	Number of stocked quarter-milacres
Region	2	921	188.9
Within regions	6	317	64.0
Binders	1	110	25.0
Fungicide	1	812	64.0
Binder X Fungicide	1	393	36.0
Error	24	221	25.1
Total	35		

[1]Based on examination of 40 quarter-milacres, or 0.01-acre area per plot.

TABLE 3.—SUMMARY OF FIRST-SEASON STAND OF DOUGLAS-FIR SEEDLINGS RESULTING FROM BROADCASTING ENDRIN-COATED SEED AT ONE POUND PER ACRE

Grouped by	Seedlings per acre	Quarter-milacre stocking[1]
	Number	*Percent*
Binder		
Methocel-rhoplex	2,790	39
Dow Latex 512-R	2,440	34
Fungicidal additive		
None	2,140	33
Arasan 75	3,090	40
Region		
British Columbia	1,900	26
Washington	3,590	46
Oregon	2,350	37
All, not grouped	2,610	37

[1]Quarter-milacres supporting one or more seedlings are "stocked."

Methods

Nine replications of the test were installed during the winter 1956-1957, three each in British Columbia, Oregon, and Washington. A replication consisted of four 0.1-acre square plots with a minimum distance of five chains between plot centers. Plots were on south-facing slopes with gradients of from 10 to 30 percent, of similar elevation and ground cover. Broadcast Douglas-fir seedings were made at the rate of one pound per acre. All seed was treated with the rodenticide endrin and overcoated with aluminum for protection against birds. The four differential seed treatments, randomly assigned to the plots of each replicate, were as follows:

1. Methocel-rhoplex (standard)
2. Methocel-rhoplex, Arasan 75 added
3. Dow Latex 512-R (alternative binder)
4. Dow Latex 512-R, Arasan 75 added

Seeding was done in the period December 1956 to February 1957. In June 1957, counts of Douglas-fir seedlings were made on a sample of 40 circular quarter-milacres uniformly distributed on each 0.1-acre plot. Data were analyzed by standard statistical methods.

Results

The first-season data for total Douglas-fir seedlings and stocked quarter-milacres, or those having one or more seedlings, are presented in Table 1. The analysis of variance on these data is presented in Table 2. All data are summarized

[3]Anonymous. 1956 formulation for the treatment of coniferous tree seed. U. S. Fish and Wildlife Service, Wildlife Research Laboratory. 2 pp. mimeog. Both Oct. & Nov. ed. 1956.

by the factors under test and expressed in more familiar terms of seedlings per acre and percent of quarter-milacres stocked (Table 3). The interactions of region with binder and fungicidal additive were included in experimental error after first being found non-significant. Differences attributable to seed treatment proved non-significant at the 5 percent level of probability.

The relationship of number of seedlings per 40 quarter-milacres, Y, to number of stocked quarter-milacres, X, was examined inasmuch as both had been used to measure effect of treatment. The relationship is expressed by the equation plotted in Figure 1:
$Y = -2.34 + 1.278\ X + 0.0385\ X^2$
This relationship proved highly significant at the 0.1 percent level of probability; the standard error of estimate is 5.95.

Discussion

The addition of Arasan 75 in the seed coating raised the cost of treatment by about four cents per pound of seed. Laboratory tests of two seed lots indicated that this addition caused a reduction of 8 to 10 percent in viability. The field test showed no advantage afforded by use of Arasan 75. It is possible that this reduction in number of viable seeds sown on the Arasan plots was offset by increased protection of the remaining viable seed against loss to rodents or to fungi.

As an adhesive, Dow Latex 512-R performed as well as methocel-rhoplex and proved easier to handle. The latex is ready for immediate use after dilution of the stock solution. By contrast, the methocel-rhoplex adhesive requires a two-step preparation, since the aqueous solution of methocel should stand for 24 hours after blending.

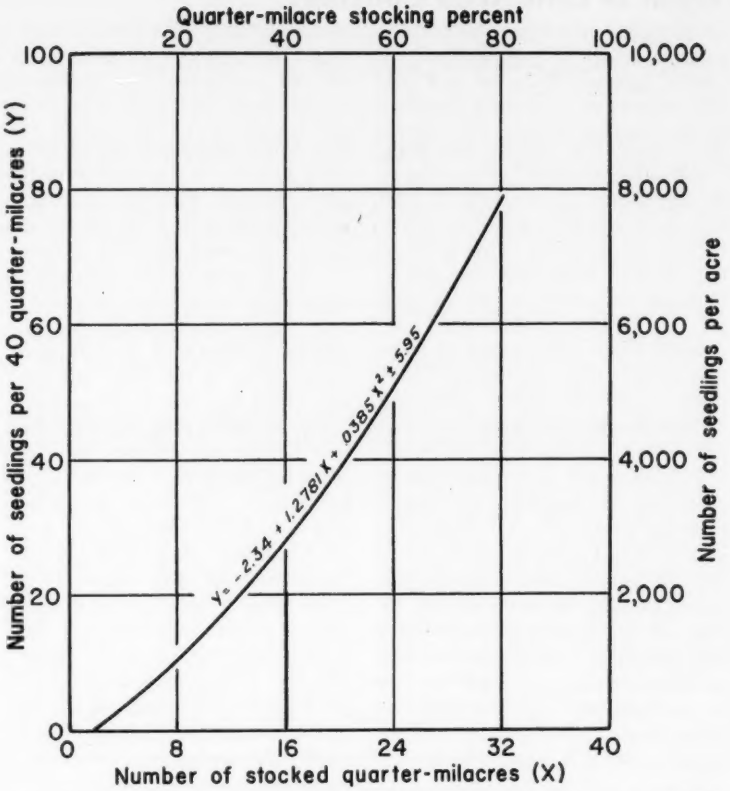

FIG. 1.—Relationship of number of Douglas-fir seedlings to stocking of quarter-milacres, based on seedling counts on 1,440 quarter-milacres.

The quarter-milacrce sampling unit used in this test is smaller than those normally used in forest reproduction studies. Its advantage lies in the ease and intensity with which it can be scrutinized for small seedlings. The very highly significant correlation obtained between number of seedlings and number of stocked quarter-milacres indicates that both are suitable measures of outcome of the test. However, because of the magnitude of the standard error, caution is necessary in applying the regression to determine the number of seedlings per acre from the percent stocking, as is often done in forest inventory.

Summary

A cooperative factorial experiment was conducted in British Columbia, Washington, and Oregon on direct seeding of Douglas-fir. A total of 36 0.1-acre plots were broadcast at the rate of one pound per acre with endrin-coated seed. The addition of the fungicide Arason 75 to the endrin coating proved unnecessary. The substitution of Dow Latex 512-R for methocel-rhoplex as the binder proved satisfactory. Outcome was measured by first-season stocking which averaged 2,610 seedlings per acre. This indicates satisfactory rodent control by the endrin coating and, with reasonable survival, should prove adequate reproduction.

What Is Unit Area Control?[1]

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IN CALIFORNIA, where the term "unit area control" was coined, no discussion of the subject continues long before someone refers to Duncan Dunning. That is proper; besides inventing the name, Dunning conceived the idea behind it. But to give credit where due, another name also should be associated with unit area control. That name is William Hallin. Dunning retired shortly after proposing unit area control, before it had received a wide degree of acceptance among foresters. It remained for Hallin to grasp its import and usefulness and to impart them to others. During the past 5 or 6 years he has been telling foresters about it through publications, conferences, and practical demonstration. The purposes of this paper are further to explain unit area control, to show how it has evolved, and to suggest how it is still evolving.

Concept of the System

Unit area control is a rather complex idea and there has been some misunderstanding about what it means. For example, some foresters in California still seem to believe that it means clearcutting sugar pine in small patches. The first visual demonstration, at the Stanislaus Experimental Forest, did do that. However, unit area control is much broader than that in method and in applicability to other forest types. It is a system—an orderly approach to the problem of accomplishing continuous forest production.

Unit area control is based upon the conclusion that many forests are composed of a mosaic of small comparatively homogeneous subdivisions. The subdivisions are differentiated by characteristics that may be significant in management. They include, to name some of the more obvious qualities: age-class, species composition, thrift, understory vegetation, and stand density. These unit areas or condition classes are proposed to be the primary object of attention in management, rather than the individual trees. That is the first and most important feature of the method.

The proposal that the individual tree should not be the principal center of attention was a novel and bold idea in California when it was first advanced. Previously, most considerations that governed timber harvesting were related to the tree. Was it thrifty? Was it in danger of attack by insects? Was it deteriorating owing to decay? Was it of high economic value? Obviously, such questions are important, and they cannot be summarily dismissed in a commercial enterprise.

On the other hand, the methods of marking that had resulted from looking at the trees one at a time often produced disappointing results silviculturally. Too often partial cutting favored the less desirable species of trees or encouraged the invasion of shrubs and other low vegetation. It did little to start new stands of the desired species or to provide for the orderly succession of age classes that is essential to continuous forest production. It often caused an alarming amount of injury to reserve trees and advance growth. Evidently, the prevalent methods of partial cutting for such purposes as economic selection, insect risk, and sanitation-salvage had not supplied a satisfactory solution to the problems of long-term management.

Adoption of the homogeneous subdivisions as the units of management seems to observe sound ecological principles. The trees in a forest do not grow as self-sufficient entities. Each tree is affected either directly or indirectly by all neighboring vegetation. The individual plants, both trees and other kinds of vegetation, compete for light, water, and space; they supply mutual protection against the wind; and they interact in almost countless other ways. Every homogeneous unit has developed its own particular relationships.

The differences between the unit areas reflect both natural conditions inherent in the habitats and conditions that have been superimposed. For example, differences in the soil or slope of course are inherent and cannot be readily altered by cultural methods. In contrast, a difference in species composition may be the consequence of accidental events such as the availability of seed at some past date when the areas had been cleared of vegetation.

When a forest is modified by timber harvesting or other cultural treatments, the individual plant communities that make up the different unit areas react in various ways. For example, consider the reactions of several condition classes to a selective cutting. In a unit where a shrubby undergrowth exists, thinning the overstory probably will cause the shrubs to intensify in density. In a unit where most of the trees are overmature, thinning them will probably hasten the deterioration of the remainder. In a young, thrifty forest, thinning probably will improve the growth of the trees that are left. That is why the unit area is emphasized as the logical segment for cultural treatments, rather than the individual tree.

Considerations in Application

At first, forest managers apparently viewed the unit areas as a systematic arrangement primarily for silvicultural purposes. However, they also found them extremely useful for a variety of other forest management purposes. The units provide an excellent classification for forest inventory and

[1]Paper presented at the Forestry Section, Northwest Scientific Association, Annual Meeting, December 28, 1956, Seattle, Wash.

[2]Maintained at Berkeley, California, by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of California.

management planning. They recognize the conditions that are significant in calculating allowable cut and growth, and also in attaining the even distribution of age classes required for forest regulation. They supply the information needed to allocate the annual cut to specific places because they indicate which units should be harvested first and where cutting should or may be deferred.

The method specifies that management be governed by three major considerations. These are (1) the objective of the owner or manager, (2) the silvical requirements of the trees, and (3) the condition of the forest. Naturally, the wishes of the owner come first. It is essential that the objective be attainable and clearly defined. The purpose may be to grow high grade sawtimber or any other product. Whatever is chosen will influence subsequent action.

The capabilities or silvical requirements of the trees constitute the second major consideration. These are primarily ecological characteristics, such as seeding habits, of which a large number are known and many are well understood. No special emphasis should be needed here to prove that the forester must understand the requirements of the vegetation in order to manage it effectively.

The condition of the forest is the third major consideration. The forester must recognize the mosaic of unit areas that are to be the subjects of silvicultural treatments. Units composed of unthrifty, overmature trees should be designated for harvesting and regeneration as quickly as possible. The thriftier units should be held for later cutting consistent with the allowable cut and needs for attaining an even distribution of age classes. Sapling stands should be thinned or pruned to improve growth in quality if that is indicated by the objective of management.

Unit area control provides for the use of all measures that will assist in furthering management. It is not, as some have supposed, a silvicultural system. It does not rely on any particular silvicultural method or operation. At the same time, one of its very important features is that it stresses the necessity of performing all essential steps. Flexibility is another of its characteristics. A common weakness of forest practices in the West is to employ a single formula too widely. Each unit area must be treated discriminately. Any particular action should be appropriate for the area where it is applied.

In the trials in California, regeneration of pine in small clearcuttings has been emphasized. Two reasons can be offered. First, in the pine and mixed-conifer types, prompt regeneration of pine is considered to be the most important problem. Second, small clearcuttings, up to about 5 acres in size, surrounded by pine seed trees, and with seedbed preparation and rodent control provided, seemed to offer the most favorable condition. Futhermore, removing all overstory trees before beginning regeneration eliminates the need for later recutting with attendant damage to reproduction. However, these experiments should be regarded as applications only to particular situations. Had the objective been to convert mixed conifers to white fir, considerably different steps probably would have been taken.

Experience has shown that some alterations in the shape and size of the original unit areas are desirable. When natural reseeding in clearcuttings is attempted, the maximum size of the openings is limited by the distances to which the seeds of the preferred species can be disseminated in adequate numbers. On the other hand, very small openings are unsuited to the use of large machines for logging and seedbed preparation. Small openings also magnify border competition effects. For practical purposes, under the conditions that have been tried, 5 acres seems most desirable, although a final conclusion has not been reached.

All units cannot be adjusted to the desired size in the first cutting, but many of them can. Overly large units can arbitrarily be cut into fractions. Some small units can be combined. For example, a small unit ready for regeneration cutting can be combined with an adjacent nonstocked area at the time of seedbed preparation or planting.

Further refinements and adaptations of unit area control can be anticipated. When first conceived, it related largely to the silvicultural problem of regenerating certain desired species of trees. Then it was found to be useful for management problems such as regulation of the cut. More recently, the desirability and practicability of modifying the size and shape of the original unit areas was determined. Further experience and application to different forest types and in other regions are certain to bring about more changes.

Summary

Unit area control is a method of forest management that was developed in California. It was devised primarily because earlier methods of harvesting timber in pine and mixed-conifer types had not resulted in satisfactory regeneration and other desired objectives. The major distinguishing feature is adoption of unit areas composed of homogeneous condition classes as the subject of cultural treatments. Classification of a forest into unit areas also is useful for inventory, calculation of growth and allowable cut, and planning for a uniform distribution of age classes up to rotation age. It provides a system by specifying that management should be governed by the objectives of the owner, the silvical requirements of the trees, and the condition of the forest. In California, the indications are that it leads to even-aged management in small unit areas of about 5 acres although even-aged management is not an inherent requirement of the system.

Propagation Techniques Applicable to Longleaf Pine

Although appreciable literature exists concerning the propagation by vegetative means of loblolly, shortleaf (*4, 5*), and slash pines (*2, 3*), there is little published regarding the vegetative propagation of longleaf, another important southern pine. The species has several attributes which recommend it for consideration in future tree improvement programs. It has generally good form, is resistant to fire, tipmoth damage, and fusiform rust, and grows to merchantable size on extremely poor, sandy sites. It is therefore encouraging to note that longleaf pine can be vegetatively reproduced by several methods. This capability is important in increasing clonal stocks and for the establishment of seed orchards.

In 1946, Dorman (*1*) attempted to root some cuttings taken from longleaf pines. Seven of his 36 cuttings rooted successfully and were outplanted in 1947. Six have survived through 1957, and range from 9 to 24 feet in height.

In February 1955, 15 scions from a high-gum-yielding longleaf pine in Mississippi were sent to Lake City, Florida for grafting. At that time the scions were bottle-grafted onto slash pine plantation stock of suitable size. Three of the grafts were successful.

In July 1956, 15 airlayers were made in the crown of a 52-year-old superior phenotype of longleaf pine. Nine of the airlayers rooted in the tree between October 1956 and February 1957. Five of these were successfully outplanted during the summer of 1957.

The longleaf propagules outplanted near Lake City are vigorous, and seem to grow as rapidly as slash pine propagules from trees of the same age. While the percentages of successful takes with these three methods have been low on initial trials, the important consideration at the moment is that longleaf pine can be vegetatively propagated by means of the same techniques employed with other southern pine species. With further tests, propagation techniques can probably be refined to give a greater degree of success.

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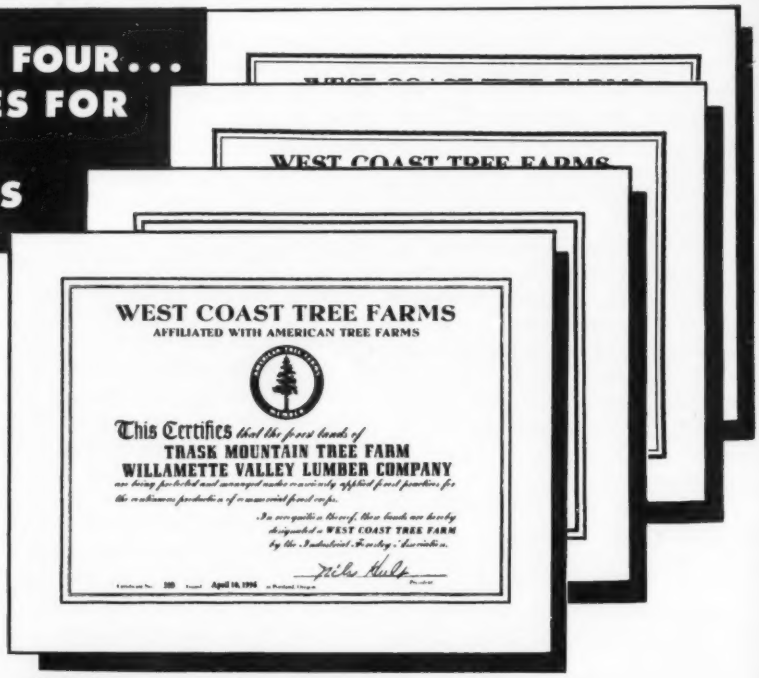
NOW THERE ARE FOUR... GROWING TREES FOR FUTURE GENERATIONS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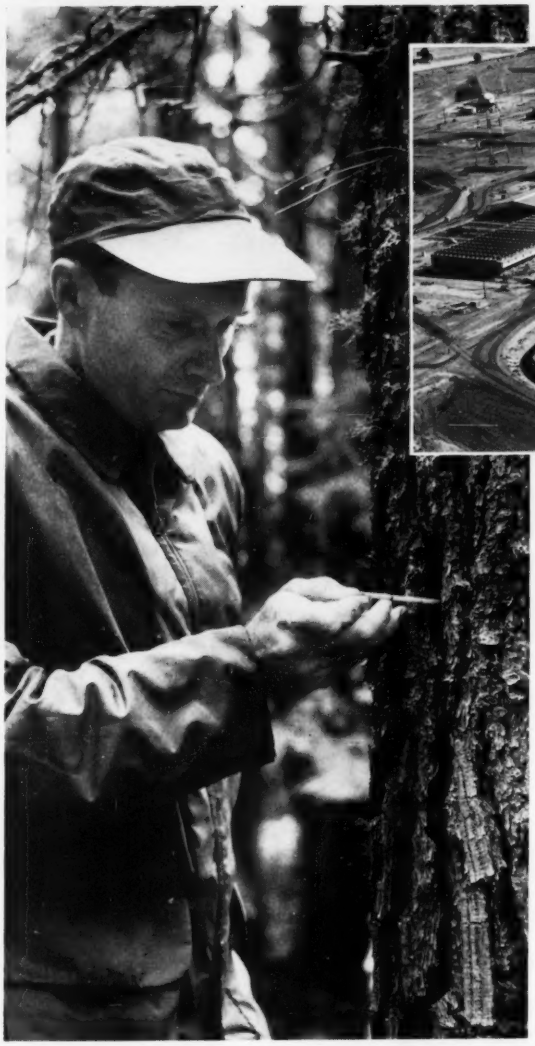

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The Cooperative Role of The Society of American Foresters

Henry Clepper
Executive secretary,
Society of American Foresters

FROM THE beginning of forestry in America a notable characteristic of the profession has been the social consciousness of the individual forester. Without wishing to idealize him, I can think of many communities in which the local forester is a leading citizen carrying numerous responsibilities in social and civic life, quite apart from his professional duties.

It is a commonplace for foresters to serve on municipal councils and in similar elective or appointive offices. They participate in such voluntary agencies as community chest committees, boards of health, church directorships, planning and improvement bodies, school boards, scout councils, and in numerous other offices promoting the public welfare.

In my own professional career, spanning nearly four decades, I have had the rare privilege of personally getting to know literally thousands of foresters. Very few evidenced any aversion to performing their obvious duties as citizens and civic leaders. The typical forester as I know him is a gregarious person, who adapts readily to the social and economic complexities of collective living, and whose technical and professional career, however demanding, provides unusual opportunities for discharging obligations to society. In short, he is a cooperator.

Perhaps as an expression of his cooperative instinct, and certainly as an indication of his interest in activities related to, though outside, his profession, the forester is an inveterate "joiner." In addition to the obvious church, social, political, and fraternal organizations to which most professional people belong, a forester may be a dues paying member of several associations concerned with general science, conservation, technology, or the advancement of specific areas within these categories. These range all the way from the American Association for the Advancement of Science to the Wildlife Society.

Recently, I checked off 33 national associations, 10 regional associations, and 50 state associations in which I know foresters pay dues and otherwise help advance their programs. Even if a forester belongs to only a half-dozen of these, the interesting fact is not that he belongs to so few, but, in view of his often modest salary, that he belongs to so many.

After two decades as the executive officer of the Society of American Foresters, I have reached the conclusion that a convincing reason for the high *esprit de corps* and the strong bonds of solidarity

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among our members is the opportunity provided by the activities of Sections and Chapters for positive group action. This action takes two forms.

On the one hand, we have members who find outlets for their urge to carry on cooperative professional activities by serving on committees, by participating on programs, by organizing meetings and field trips, and in numerous other ways helping "to promote the science, practice, and standards of forestry" through Section and Chapter projects.

It is surely no coincidence that most members of the Council and presidents of the Society have been former officers of Sections or of Section committees. Somewhere there is an editor of a Section news letter who is the future editor of the JOURNAL OF FORESTRY or of *Forest Science*.

On the other hand, we have many members who not only utilize their cooperative urge to participate in Section affairs. They carry their proclivities one step further to provide cooperation between the Society on regional, state, or local levels with other technical groups similarly organized.

For example, the Puget Sound Section has had joint meetings with the Vancouver Section of the Canadian Institute of Forestry. Some Sections have had cooperative activities, including meetings, with state "Keep Green" committees. Several Sections have held well-attended joint regional meetings with the American Society of Range Management and with the Wildlife Society.

All this discussion is preliminary to the main purpose of this article, which is to describe some of the Society's cooperative activities on the national and international levels.

AAAS

In the American family of professional and scientific societies, our Society, even though approaching its 60th anniversary, is but a child compared with some of the senior organizations. For example, the American Association for the Advancement of Science is now 110 years old.

In 1913 our SAF became an affiliated society of AAAS, with two representatives on the AAAS Council. Some years ago our Society held its annual meetings jointly with AAAS, but this custom was discontinued when our own meetings became so large that it became desirable to break away. However, numerous SAF members attend the meetings of AAAS. In fact, at the 1958 meeting, scheduled to be held in Washington, D. C. during the period December 28-31, our Society is one of the sponsors of a two-day symposium

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on water and agriculture arranged by AAAS Section 0, Agriculture.

Our Society helped compile the Association's booklet *Books of the Traveling High School Science Library*. This project supported by a grant from the National Science Foundation, makes it possible for high school students in communities lacking adequate science libraries to gain access to books calculated to stimulate their interest in science. During its four years of existence the traveling library has been of special assistance to students choosing professional careers in the sciences. There are 200 books in the library which are circulated in some 100 selected high schools. Forestry is, of course, represented.

National Research Council

Another agency, with high prestige in scientific circles, with which our Society has long been affiliated is the Division of Biology and Agriculture of the National Research Council. The Council, organized in 1916, is a companion organization of the eminent National Academy of Sciences created during President Lincoln's administration.

Within the Council are eight divisions covering all fields of science. The Division of Biology and Agriculture, in which the SAF has an official representative, has representatives from the federal government and from about 30 professional and scientific societies.

In 1947 a Joint Committee of Forestry of the Council and the Society brought out the book *Problems and Progress of Forestry in the United States*, the first postwar appraisal of the situation.

This affiliation gives the Society a valuable opportunity to participate in many aspects of scientific activity at high official levels. For example, important units of the Division are the Agricultural Board and the Committee on Natural Resources, on both of which the Society is represented.

In a more direct way, the SAF has benefitted from its relations with the National Research Council. Several years ago when the Society proposed to undertake a much needed study of research in forestry and related fields, the endorsement of the proposal by the Division of Biology and Agriculture was doubtless a contributing factor in the Society obtaining a financial grant from the Rockefeller Foundation. A report of the study was published in 1955 as a book with the title *Forestry and Related Research in North America.*

AIBS

Incorporated in the District of Columbia in 1955, the American Institute of Biological Sciences is a national association of societies active in various aspects of biology, from botany to zoology. The SAF is an affiliate.

The Institute assists biological societies in national projects and problems, and fosters cooperation between all societies and persons engaged in research, teaching, or the application of biology. It arranges an annual meeting for biological societies. Attendance may range from 2,000 to 4,500.

A quarterly magazine, *AIBS Bulletin*, publishes articles of a general nature about biological affairs, news, book reviews, and reports on conferences. It is the single national source of information of importance to biologists. The Institute also sponsors the publication of special material, such as the *Handbook of Biological Data*.

One of the Institute's continuing projects of significance to the forestry profession is the national register of scientific and technical personnel. This is a cooperative activity with the National Science Foundation. The register, authorized by act of the Congress, is maintained as a tool for the location of scientific and technical skills under emergency conditions. It also provides information on the supply of scientific and technical personnel, information which is important in the development of national policies affecting their training and utilization.

Questionnaires for this register were mailed to all members of the Society having five years or more professional experience. In January 1958, AIBS reported that of 17,000 biologists registered the greatest number were in forestry. They were mostly in research, with teaching, and management and administration following closely.

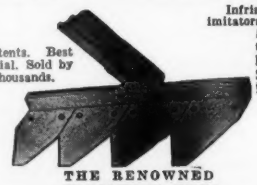
Currently, the Institute is working to improve the salary scales of all biologists employed under Civil Service.

Cooperation in Education

Beginning in 1933 the Society of American Foresters has been accrediting professional education in forestry. It carried on its activities independently of other accrediting agencies for two decades.

For 1952 the National Commission on Accrediting developed a plan whereby the various accrediting agencies, including the professional societies active in this field, agreed to undertake their accrediting work cooperatively with the appropriate regional educational associations. Currently, the National Commission recognizes seven regional educational associations and 21 professional societies of which the Society of American Foresters is one.

Since the SAF has participated in cooperative accreditation, it has had representatives on committees



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of the Middle States Association of Colleges and Secondary Schools, the North Central Association, the Northwest Association, and the Western College Association.

Among the professional organizations with which the Society has worked jointly are the American Association of Collegiate Schools of Business, American Bar Association, American Chemical Association, American Council on Education for Journalism, American Council on Pharmaceutical Education, American Library Association, Engineers' Council for Professional Development, National Association of Schools of Music, National League for Nursing, and several others.

Natural Resources Council

Formed in 1947, the Natural Resources Council is an organization of organizations. It has 40 members. Its role is that of a service agency to them.

Included in the membership are scientific organizations, such as the American Society of Limnology and Oceanography; professional organizations, such as SAF; technical organization, such as the Wildlife Society; and citizens' conservation organizations, such as The American Forestry Association.

In general, the functions of the Council are to effect closer cooperation between the member organizations; to obtain and exchange information on legislation and administrative regulations on natural resources; and to make available to member organizations scientific and technical data on conservation.

This information is made available through the *Conservation News Service* and special bulletins sent to the members. In 1956 the Council sponsored a book, *America's Natural Resources.*

The Council does not undertake to control the policies or actions of member organizations. It does not engage in lobbying activities.

Through the activities of the Council the scientist and the sportsman, the technician and the teacher have a common meeting ground where they, represented by the organizations to which they belong, can exchange ideas and discuss conservation issues. Usually two meetings are held each year.

Our Canadian Colleagues

During its history the Society has enjoyed friendly and cooperative relations with numerous sister societies and associations, but none has been more satisfying than our always pleasant kinship with the Canadian Institute of Forestry, many of whose members are also members of the SAF. The CIF is to our northern neighboring nation what the SAF is to the United States.

Organized in 1908 as the Canadian Society of Forest Engineers, it became the Canadian Institute of Forestry in 1950. This year it will celebrate its fiftieth anniversary at the annual meeting at Fredericton, N. B. during October 6-7.

CIF is organized by regional Sections similar to the Sections of SAF. Over the years adjoining Sections on both sides of the international boundary have had cooperative projects and meetings. Canadian foresters regularly attend Section and national meetings of the SAF, and foresters from the States likewise have always been welcome at CIF meetings.

The first joint independent meeting of the two societies was held in Montreal in 1952. It was a notable gathering in many respects, and firmly cemented ties of friendship and mutual interest between the foresters of the two nations.

Subsequently, the Board of Directors of CIF accepted an invitation from the SAF Council for a second joint meeting, this time in the United States. Scheduled to be held in Minneapolis during October 1961, it promises to be the largest gathering of English speaking foresters ever held in the world, anywhere.

The International Scene

At a conference of the Food and Agriculture Organization of the United Nations in 1945, an ambi-

(*Continued on page* 674.)

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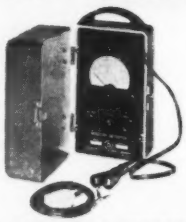

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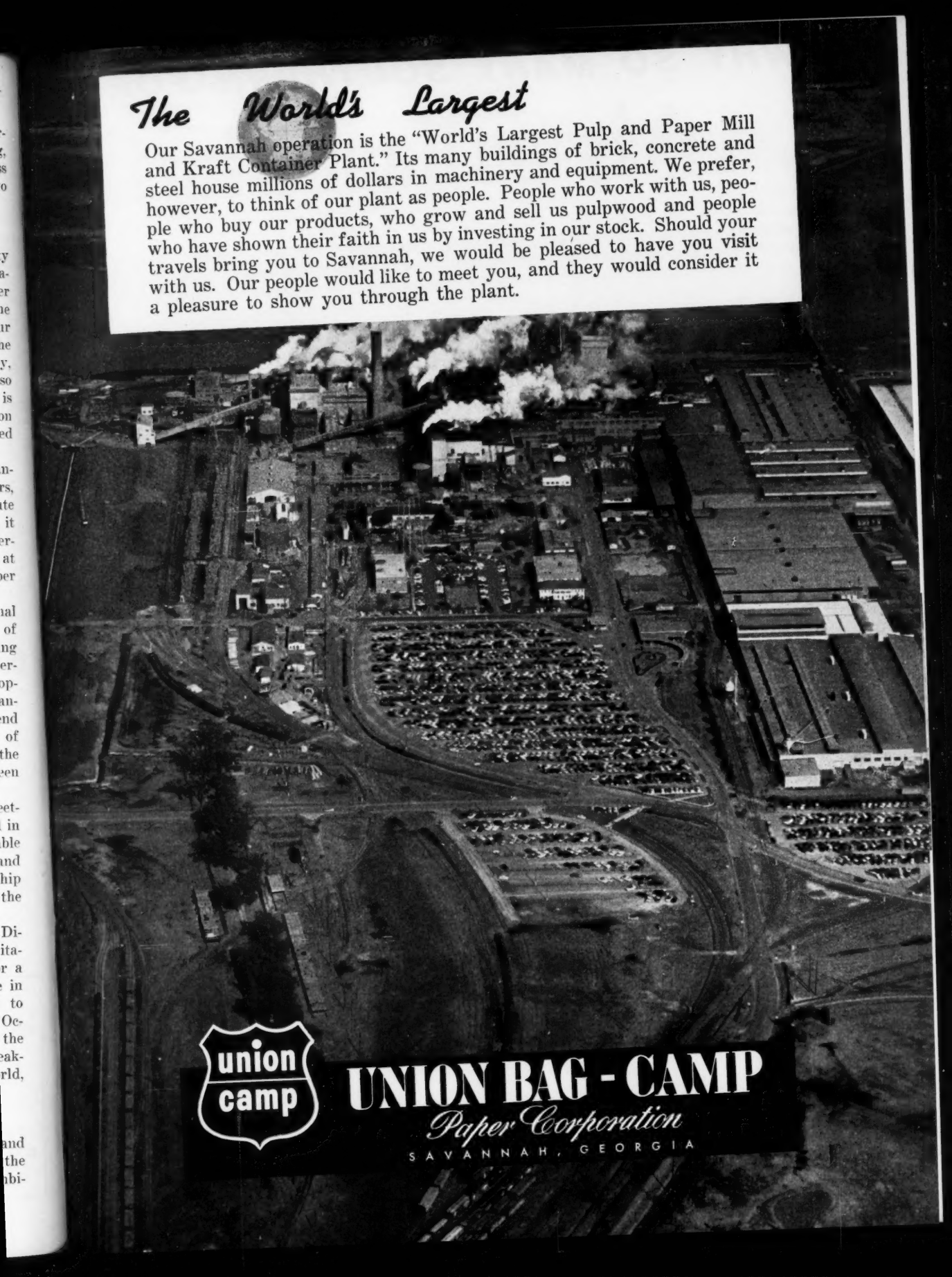
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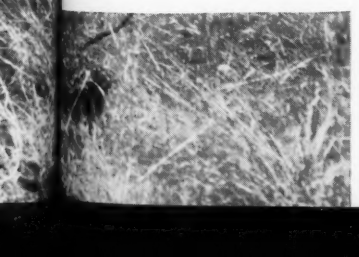
Three International TD-9's, like this one, have the job of helping protect 324,000 acres of piney woods—in Calhoun county, Florida. With the fire line plow, a radio-directed TD-9 can plow 30 to 40 miles of fire lines in 10 hours. Owner: Florida Forest Service.

Here are three TD-9's—members of the crawler fleet used by Florida Forest Service for State-wide fire control duties, on state and private forest lands. Thirty-four International crawler units were added to this fleet in 1957.

Pulling a fire line plow, this TD-9, equipped with two-way radio, is plowing fire-suppression lines in northeast Florida. One of its recent assignments was plowing 900 miles of fire lines. The TD-9 is also used for controlled burning and tree-planting operations.



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tious program was assigned to the Forestry Division. It has four objectives: (1) to increase the yield of existing world forests; (2) to reduce the waste of raw material; (3) to open up new forest areas for development, especially in the tropics; and (4) to establish new forests where feasible for the production of wood, and for the protection of watersheds and the prevention of soil erosion.

About 31 percent of FAO's biennial budget of $17,000,000 is paid by the United States. Approximately 14 percent of this budget goes to forestry. Accordingly, this nation has considerable at stake in FAO's global operations, as does the American forestry profession.

As FAO is an organization of governments, nongovernmental bodies do not engage in FAO's activities except is they may participate in advisory capacities or through membership on committees. The Interagency Committee on FAO, representing the major departments of the federal government concerned with its activities has several nongovernmental members representing farm, fisheries, and forestry. The executive secretary of the Society of American Foresters is regularly invited to the Committee's meetings.

The Fifth World Forestry Congress will be held in the United States (at Seattle, Wash. in 1960). Attendance of foreign foresters will be on the invitation of the State Department to the governments with which this nation maintains diplomatic relations. At least 300 foresters from other lands are expected to attend the Congress, which will provide a unique opportunity for American foresters to show their professional colleagues the progress that has been made in the management of all resources, both by public and private agencies, under our democratic system.

Cooperation Pays

An article twice this long could be written about the Society's cooperative relations with federal, state, and other public forestry

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agencies; with such old friends as The American Forestry Association and the Charles Lathrop Pack Forestry Foundation, and the numerous national, regional, and state forestry and conservation associations; with the several trade associations of the forest products industries; with the forestry schools; with, in short, just about every institution in America concerned with forests and related resources.

In the federal government alone, to mention every agency with which the Society has cooperative relationships would involve a long list that would be more boring than revealing, even omitting those directly concerned with forestry. Of the nonforestry agencies that regularly work with us are the Department of Labor to whose *Occupational Outlook Handbook* the Society contributes information on forestry employment; the U. S. Office of Education on matters of professional education; the International Cooperation Administration on the recruitment of foresters for foreign assignments under the State Department's technical assistance program; and the Library of Congress where is maintained historical material on forestry, particularly the Gifford Pinchot collection of foresters' photographs.

Finally, the Federal Bureau of Investigation makes frequent use of the Society's personnel records in connection with the processing of foresters for "sensitive" assignments at home and abroad.

In addition to the foregoing affiliations, the SAF has others that have helped advance forestry and the profession.

For 15 years the Society has been represented on a Joint Committee on Fire Control Equipment with the American Society of Mechanical Engineers. The purpose of this committee is to utilize the skills of the mechanical engineering profession in the development and improvement of forest fire fighting tools and equipment.

The Forest History Foundation is an organization, created in 1945, to encourage research in the history of the forest products industry and in industrial forestry. Actually, the Foundation is concerned with the preservation of materials relating to the American forest, and with the publication of scholarly works in this general field. The Society has an official representative on the Foundation's board of directors.

It has been well said that cooperation is not an exact science, but an art in which human relationships are all important. It is an art that provides for needed understanding and confidence. The gains from the Society's pattern of cooperation have been increased prestige for forestry in the professional community, and increased ability on the part of the Society to serve the profession and hence the public interest.

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Points of View

Comments on "An Estimate of Capital Needed in Forestry to Meet Projected Timber Requirements for the Year 2000"

Charles H. Stoddard's article, "An Estimate of Capital Needed in Forestry to Meet Projected Timber Requirements for the Year 2000," published in the July issue of the JOURNAL, merits the cognizance of everyone concerned with the forest economy. His careful and detailed analysis of in-put-output relations is an important contribution to knowledge of forest requirements. Further, his discussion of the optimum amount of investment points to neglected economic considerations bearing on the timber capital question. It is this second aspect of the paper which prompts this comment. What sort of procedure should be used in deciding on the optimum amount of timber? It is suggested that analysis similar to Stoddard's, which considers not only the expected demand but also the costs of capital, must be used.[1]

The problem of timber for the year 2000 is more than just estimation of the increase in demand and implementing programs to provide an increase in production to supply the increased demand. At any price above zero, there is always some potential demand for wood products which is not "met." Just because some people would like to use wood if the price were lower, lumber should not be free. In the same manner, the question of capital requirements from 2000 A.D., involves not only the size of the demand, but also the cost of growing additional timber.

If there is a situation of full employment with a large demand for capital, and a desire to balance the budget, any increased public investment in timber will have to come from additional taxes and can be expected to decrease private investment or to lower consumption, with a corresponding loss of consumer satisfaction. Therefore, those investing in public timber must demonstrate that the returns from this investment are equal to the applicable rate of interest.

Industrial and other resource development is required to meet the needs of the future; 2000 A.D. needs steel, electricity, and countless products as well as lumber. The decision as to how much should be devoted to each alternative can only be made by estimating future costs and returns and

[1] In the interest of brevity, I consider only criteria for public investment. Private investment planning is similar, but there are fewer complications from social and political considerations.

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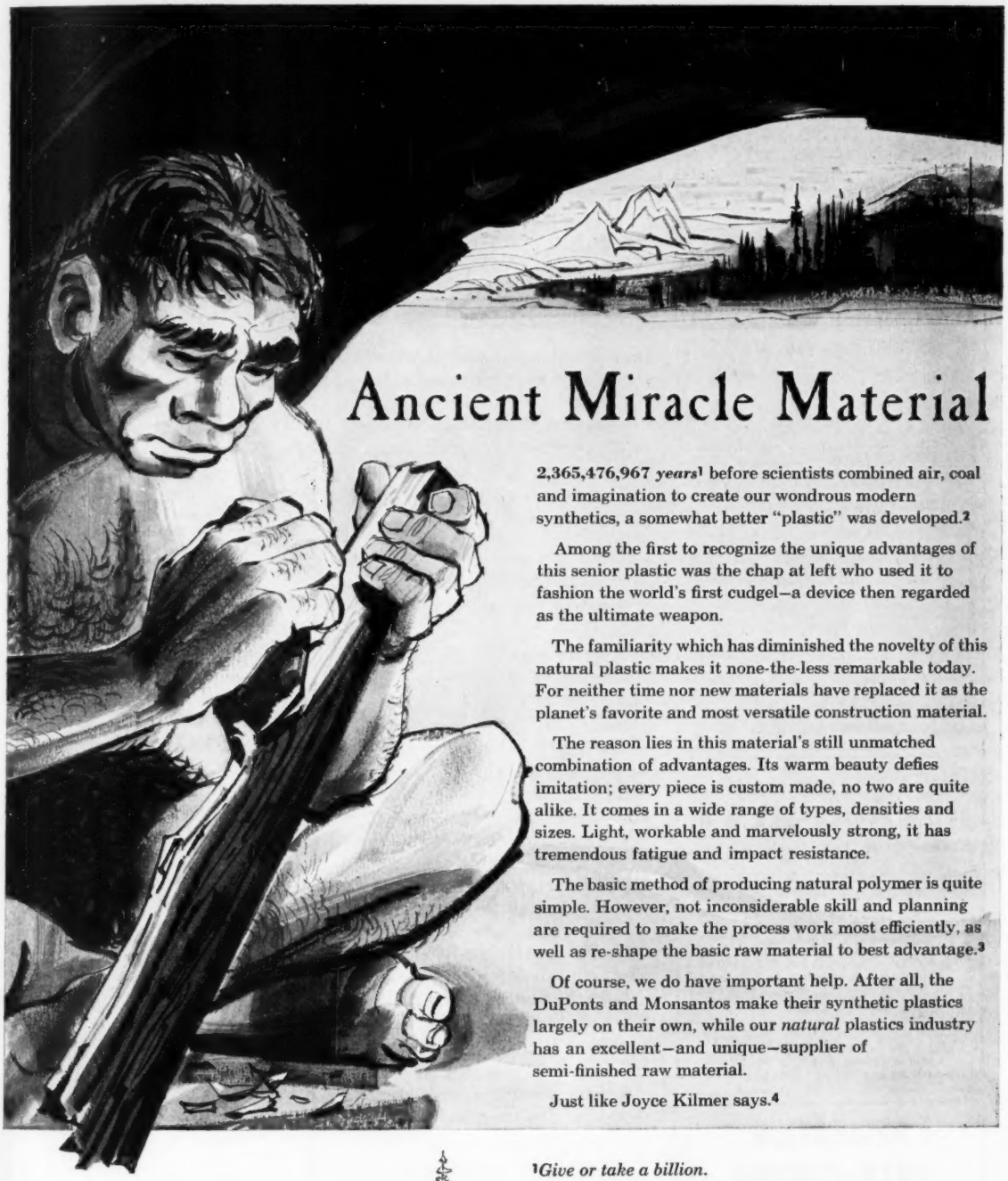

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The familiarity which has diminished the novelty of this natural plastic makes it none-the-less remarkable today. For neither time nor new materials have replaced it as the planet's favorite and most versatile construction material.

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[1] *Give or take a billion.*

[2] *This ancient miracle material is a natural organic ligno-cellulosic polymer, a true natural plastic commonly known as wood, composed of a complex of substances that has defied precise chemical definition.*

[3] *The basic process is called growth; the science of improving it forestry; the re-shaping is better known as forest products manufacturing.*

[4] *Surely you remember only who can make a tree.*

This is an advertisement? Indeed it is. Published on behalf of the forest "plastic" products industry by St. Paul & Tacoma Lumber Co., Tacoma, Washington, (a Division of St. Regis Paper Co.), to suggest that newness and utility are not always synonymous. Nor are promise and performance.

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Even if the country is in a depression, and money invested in timber can not be regarded as detracting from the private sector, some method like the input-output method of Stoddard's is needed. Although the government may be deliberately running a budgetary deficit and devoting funds to conservation, it is unlikely that the monies will exceed investment opportunities. Conservation requires that these funds be used to secure the greatest benefit for society. The choice between alternative projects can only be made on the basis of the discounted expected costs and returns. For example, even if there are no alternative uses for capital outside the government, if a program of stand improvement will yield a higher profit than a project of reforestation, the former should be chosen if the level of governmental expenditures will not cover both.

This argument raises three issues: (1) should the amount of capital to be devoted to timber be decided on economic grounds alone?; (2) what interest rate should be used?; and (3) can the future be forecasted so that required estimates can be made?

The total amount of funds to be devoted to natural resource development may not be an economic decision; national defense, social and political considerations are probably overriding determinates. However, once the total is established, the internal allocation between projects should be made by analyzing the economic returns.

Further, in this day of rockets, sputniks, desperate need for research and educational facilities, public construction, etc., money spent on timber must demonstate that it has a high economic profitability. No economic calculation will yield the amount to be spent on missiles as opposed to forests, but when money is needed for defense and social requirements, all governmental economic investments must be evaluated rigorously

(Continued on page 682)

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to assure that the returns can be expected to justify the outlay.

There is no one correct rate of interest to be used at all times in such evaluation. The principle of selection should be the rate of return which could be earned if the capital was devoted to other uses, i.e., the oppportunity cost. Both the cost of bonds and taxes are relevant.[2]

The solution to the dilemma that a procedure like Stoddard's requires judgments of the future, about which we can never have knowledge, is a pragmatic one. We have to estimate the future, either explicitly or implicitly. It is better that investments be made on the most rational basis and with the best data possible, even if knowledge is less than perfect.

A correlary to this proposition is that research should be directed toward improving estimation procedures for these calculations. Stoddard's article records many areas in which enlightenment is sorely needed.

In conclusion, the methodology of analysis suggests four propositions.[3] First, estimates of the future timber situation should give more consideration to the cost of investment. An estimate of consumption trends is a necessary but not a sufficient guide for public policy. Second, investment in timber must be based on a demonstration that discounted future returns are expected to be less than costs. Third, there is no one optimum yearly amount of investment, rather the correct increment of forest capital is a function of the state of the economy, demand for capital, price of wood products, interest rate, etc. Fourth, research in the field of forest economics should be directed toward the development of investment criteria and the development of data for such decisions. Stoddard suggests one method for evaluating investment. There are other techniques of which capital budget accounting and linear programming are only two.[4] The important consideration is that investments be made on the basis of both demand and cost considerations, including interest charges; the technique of evaluation is secondary.

This comment is not intended to be a counsel of perfection. Development of investment criteria is a theoretically difficult task and poses many administrative problems. Stoddard's analysis demonstrates the high level of professional competence which is required to make the necessary judgments in an area filled with conceptual difficulties and a dearth of data. What is needed is for economists and foresters to press on in the direction indicated in order that the United States will have the optimum of forests in 2000 A.D.

GEORGE R. HALL
Teaching Fellow, Harvard University, Cambridge, Mass.

[2]This issue has been extensively explored in regard to water resources. See Eckstein, Otto. Water resource development, the economics of project evaluation. Harvard University Press. 1958.

[3]These are the author's views of the inherent logic of Stoddard's methodology and do not necessarily represent his conclusions.

[4]Dean, Joel. Capital budgeting. Columbia University Press. 1951.

Dorfman, Robert, Paul A. Samuelson, and Robert M. Solow, Linear programming and economic analysis. McGraw-Hill. 1958.

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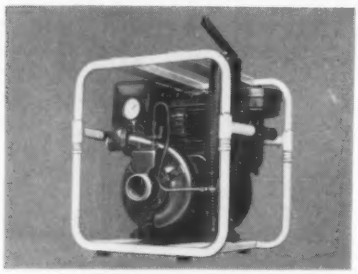

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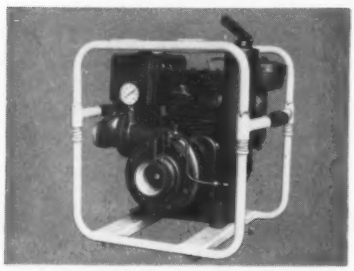

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Reviews

The Saga of a Forest Ranger

By Len Shoemaker. 216 pp. Illus. Univ. of Colorado Press, Boulder, Colo. 1958. $5.

In the words of Gifford Pinchot, who wrote the foreword of this book: "This is the story, the fascinating, realistic, convincing story of how Bill Kreutzer, the first Forest Ranger to be appointed, had to fight not only the trespassers and thieves, but his own superior officer, who did his best to prevent an honest and effective public servant from doing his duty, even to the extent of trying to get him killed."

Kreutzer was born on a small ranch in the hills southwest of Denver. At the age of 20 he gave up his job as ranch hand and on August 8, 1898 was appointed the first U. S. forest ranger. He had the advantages of resourcefulness, which came from his ranch life, as well as the encouragement of his father, to whom conservation-mindedness had become second nature during his boyhood in the Bavarian Alps.

Travelling by saddle and packhorse, much of the time with no headquarters except his tent, Kreutzer undertook the assignment of controlling fires and trespass, and curbing the lawlessness and antagonism toward government regulation which were characteristic of the time. Kreutzer sought compliance with the law and with at least the rough fundamentals of wildland management, even though his superiors often were not in sympathy with his beliefs. When trouble occurred, as it did with disconcerting frequency during those early days, Kreutzer did not stop to ask if it was politically expedient to act. He met the situation head-on and tried by persuasion, rarely by threat, to turn the trouble-makers into cooperators. In this he was remarkably successful, although he encountered violence time after time and even was shot at.

Shortly after his appointment, government funds ran out. The supervisors resigned and all rangers were dropped or furloughed, except Kreutzer, and he had the distinction of being, for a while, the "Lone Ranger."

Then came the day when the reserves were transferred to the Department of Agriculture and the present Forest Service was born. Kreutzer advanced to forest supervisor. When he and the regional forester determined that sheep should come on the forests to utilize the largely empty high ranges, he met bitter opposition from the cattlemen and repeatedly found himself in the middle of a cattle-sheep war. He could not foresee that those early guesses at grazing capacity were sometimes optimistic and that more hectic days would come when it was found necessary to correct them. The biggest battles over grazing reductions started after Kreutzer retired in 1939 and are, of course, not a part of this saga.

A first impression may be that Len Shoemaker's book is a series of adevntures and hair-raising narrow escapes. However, one obtains enough understanding of the conditions, the people, and of the day-to-day work to appreciate that these early old timers, like Bill Kreutzer, contributed immeasurably to the making of Forest Service policy as well as to the beginnings of Service tradition.

It is unfortunate that author Shoemaker has sandwiched the second half of Kreutzer's 41 years of service into one short chapter. I believe most readers would like to know a little more of his approach to modern problems after the Forest Service had been firmly established, after policy had been formalized in thick manuals and handbooks, and after regulated, lawful use of the forests,

(*Continued on page* 688)

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for which he had fought so tenaciously, became accepted and routine. Apparently Kreutzer continued to have frequent opportunity to exercise his remarkable flair for diplomacy and persuasion.

This book, with its distinctly western tone, is a welcome addition to the all too few published personal accounts of early forest officers. These make up the published Forest Service history and acquaint the modern forest officer, as well as the public, with the traditions which have done so much to shape the character of the Forest Service. Shoemaker has done a good job in recording the events of one such career before the files were lost and the recollections became too dim.

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Lumber

By Nelson Courtland Brown and James Samuel Bethel. 2nd ed. 379 pp. Illus. John Wiley & Sons, New York. $9.

Eleven years have passed since the first edition of *Lumber* was published. During this period, the lumber industry has seen a tremendous demand for its products. At the same time, the industry has been faced with increasing competition from other building materials and rising costs of production. In preparing this new edition, the authors have recognized the transitions and problems of the industry.

The text material has been rather completely revised. Out-of-date or superfluous materials have been eliminated for the most part and some very timely material added.

A brief history of the lumber industry in the United States giving the most recent available statistics on forest resources is presented in Chapter I.

Chapter II, covering type, size, location, and layout of sawmills, gives much greater emphasis to these matters than was given in the first edition. This chapter is extremely valuable reading for anyone concerned in any way with sawmill planning and location. A material flow diagram and several line drawings of plant layouts are shown.

The chapters on log storage and hauling, sawmill machinery, and lumber manufacturing processes are well written and cover conventional equipment and practices for both large and small operations. Items of equipment which could well have been included are metal detectors, debarkers, and chippers. While mention of the last two and some illustrations are included in a later chapter, the reviewer feels that the growing importance of residue utilization for pulp warrants more complete information on barkers and chippers as employed in sawmills.

The chapters on drying lumber, power and material handling, and lumber grades and sizes are much improved over information in the earlier edition. The reviewer is particularly pleased to see a specific section on materials handling as this is such an important cost factor in the lumber industry. In addition, illustrations throughout the book, where pertinent, show up-to-date handling methods with the exception of those for air drying where the figures illustrate rather costly piling procedures. Also in connection with drying practices, no mention was made of the use of anti-stain dips which are so commonly employed in several regions of the United States during summer weather.

An entirely new subject introduced in this edition is statistical quality control. The subject is treated simply but adequately, and

(*Continued on page* 690)

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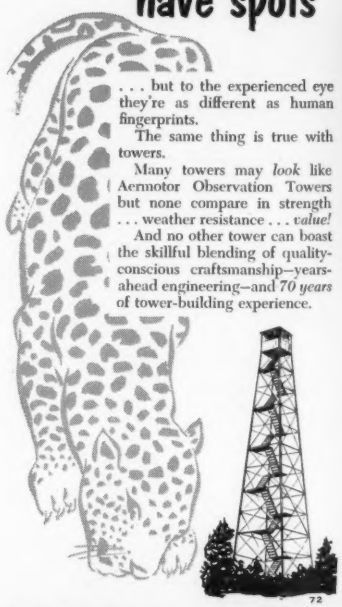

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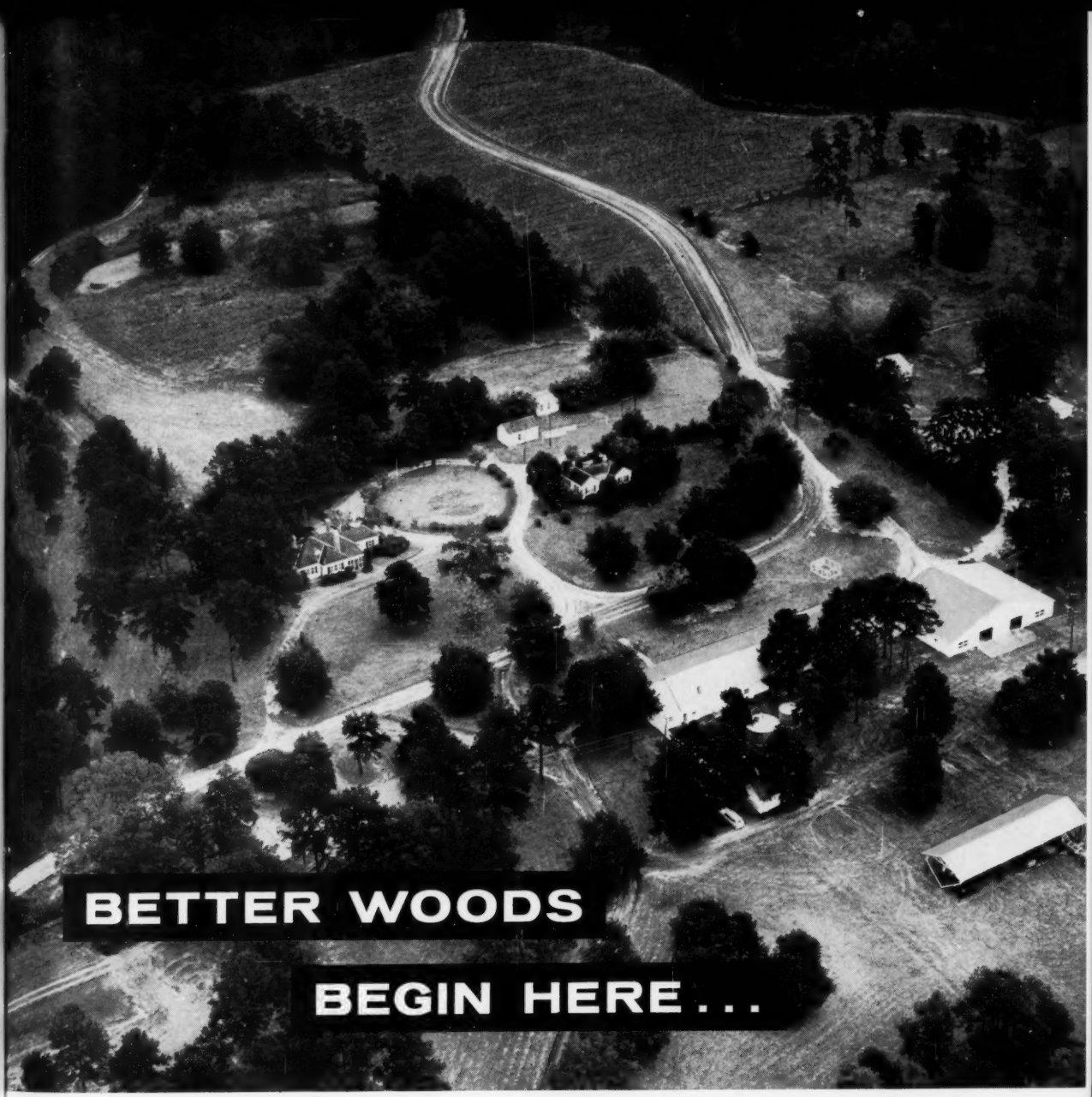

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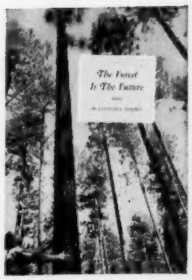

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all examples are related to lumber production. Many people concerned with quality control in wood processing operations will want the book for this chapter alone.

Another new subject is that of products allied to the lumber industry. Included in this chapter are brief discussions of glued laminated structures, wood chips, particle board, molded products, and wood briquettes. Perhaps of greater value would have been a more complete discussion of chips including chip recovery by species and chip utilization, and the utilization of short lumber and the up-grading of low common boards through end and edge gluing, pallet manufacture, and like products.

The last two chapters, "Shipping and Traffic" and "Lumber Merchandising," are little changed from information presented on these subjects in the previous edition. Some errors which were present in the earlier edition have been carried forward. For example, the statement on pages 308-309 that large quantities of white pine are transported from Minnesota and Georgian Bay to Buffalo and the Tonawandas is considerably out-of-date. Still another is the discussion of motor truck versus rail haul in which a competitive cost limit of approximately 100 miles is placed on the truck haul. The local freight rate is very important in this competitive situation. This is illustrated by the large quantities of lumber trucked at a competitive rate for distances of 500 to 600 miles into the Los Angeles market.

While designed primarily as a college textbook, *Lumber* should prove of value to the men in the lumber industry. It is very readable, well illustrated, and information added in this edition is well documented. The publisher, too, is to be complimented for a very attractive publication.

FRED E. DICKINSON
University of California

Health and Safety Code

363 pp. Illus. U. S. Department of Agriculture, Washington, D. C. $1.25.

In an effort to make life-and-limb-saving accident prevention knowledge available to all, the U. S. Forest Service has published a new edition of its safety code. Written "by Forest Service people for people in forestry," and edited by Seth Jackson, it represents the practical viewpoints of thousands of men in the forestry field nationwide, based on their collective years of experience. Health and safety principles as set forth in this book have a wide range of application. This reviewer highly recommends it to all who are in positions of responsibility for employees in forestry activities.

Although nearly encyclopedic in scope, this Code is kept compact by its bare facts form, devoid of padding and of justifications for safe practices. It is assumed that the user wants the job done safely. The Code tells him how.

Written carefully to stress the positive approach to safe practices the Code uses the words *shall* to command specific performance and *should* to suggest appropriate performance, rather than the negative *don't*. To help clarify the terse text and to vivify many of the points, the Code is profusely illustrated with thumbnail sketches, some of them humerous, most of them good as quick visual reminders.

The Code's subject matter is broken down into eight areas of safety and one of health. Some chapters have fairly universal importance. They are: Policy and Administration, Travel, Fire, Public Safety, and Health. Other chapters cover specific kinds of Project Work, Construction and Maintenance, Equipment, and Buildings and Grounds.

A decimal classification system is used to break the nine chapters down into sections, sub-sections, paragraphs, and items presumably to make for quick and accurate reference. This advantage may be partially offset by a certain amount of confusion to the user resulting

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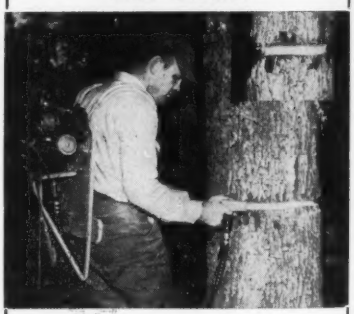

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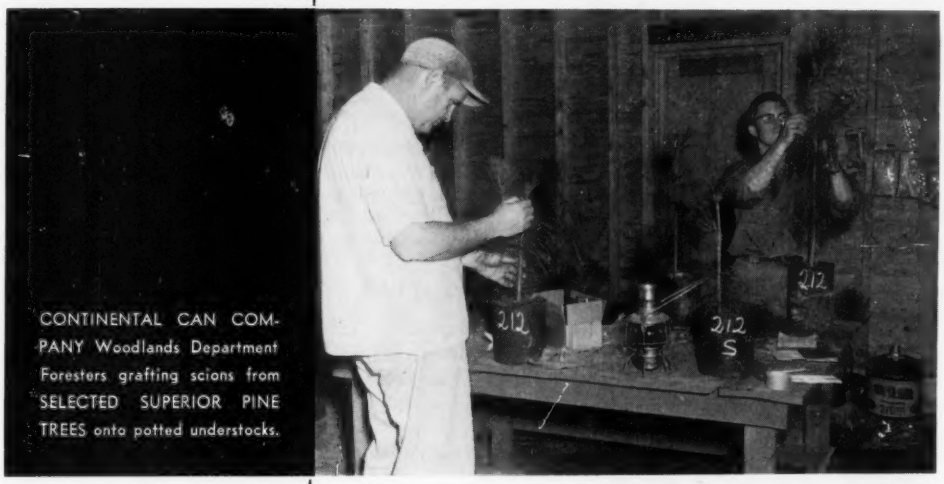

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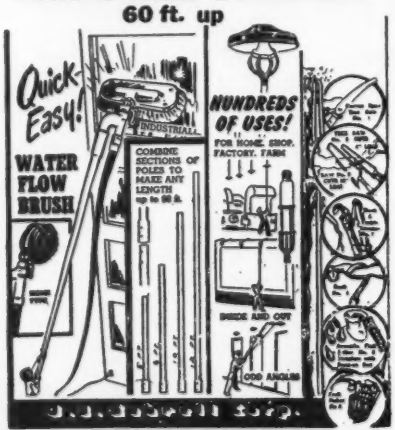

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from the system's many numbers and letters and indentations throughout the text. It is printed in hip pocket size, loose leaf, bound at the top for vertical opening, and has a flexible cover for those wishing to use it as a field manual.

The Code should prove a valuable aid to forestry associated employers, foremen, and workers as a guide for safety engineering and enforcement in writing contracts, in work policy declarations, job supervision, and inspection tours. Finally, as an aid to safety education, the Code could serve as an excellent guide for lectures on safety. Appropriate sections from it could be expanded easily and logically into organized talks by any employer or foreman with experience.

It is unquestionably the best reference book of its type known to this reviewer.

JOHN R. MEYERING
State University College of Forestry at Syracuse University

Forest Trees of Australia

Forestry and Timber Bureau. Commonwealth of Australia. 230 pp. Illus. Government Printing Canberra. 1957. 2 pounds, 2 shilling.

The northern hemisphere forester new to Australian dendrology is likely to feel overwhelmed by numbers of new species on one hand and, on the other, deceived by familiar common names borrowed from unrelated northern hemisphere trees. This applies not only to the whole tree flora of the continent, which includes a rain forest of great complexity, but especially to the eucalypt forests which are more familiar to visitors and give Australia much of its character.

Forest Trees of Australia is an excellent introduction to the eucalypt forests of Australia. Of the 193 pages of species descriptions, 155 are devoted to the genus Eucalyptus. The remainder deal with the principal native gymnosperms and a few of the angiosperms other than eucalyptus found outside of the rain forests.

The genus Eucalyptus, with more than 500 species in Australia, needs some introducing. The monographic treatments are, of course, unsuitable for field use, and the one-volume, portable "Key" by Blakeley is useful mainly to those who have had some contact with eucalypts. The present book opens with a brief and pointed description of the vegetation of Australia and then proceeds to short general accounts of the "hardwoods" and "softwoods." Four pages of general description of the eucalypts are most helpful in making apparent the relationship grouping of the species as well as the basis for the common names. In this section, there is refreshing evidence that the "new taxonomy" has taken hold; hybridization and its effects are recognized.

The standard species treatment consists of one text page in double column format, one column containing information on dimensions, distribution, and ecology, the other containing range map, botanical description, and uses. Facing the text is a full page of photographs showing habit, bark, buds, fruit, mature and immature leaves, and seedling. Sixty-seven species of eucalypts plus 15 other trees are treated in this manner. In addition, nine species groups are described in general terms. Each species group description is accompanied by a full-page photograph of a characteristic member of the group. Since eucalypts are among the most photogenic of trees and Australians love to photograph them, these halftones are outstanding. The color plates do not do their subjects justice. The end papers are an isohyetal map showing the principal commercial forest regions of Australia.

If the forester visiting Australia should have to limit himself to one book, this would be it. It is the best available guide through the maze of gums, ashes, boxes, apples, hickories, oaks, pines, and mahoganies, most of which are eucalypts, and none of which are what their names imply to northerners.

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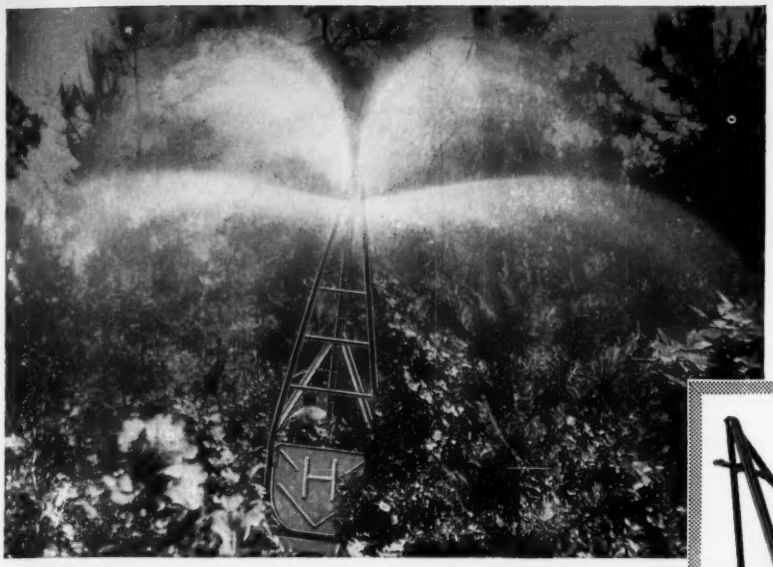

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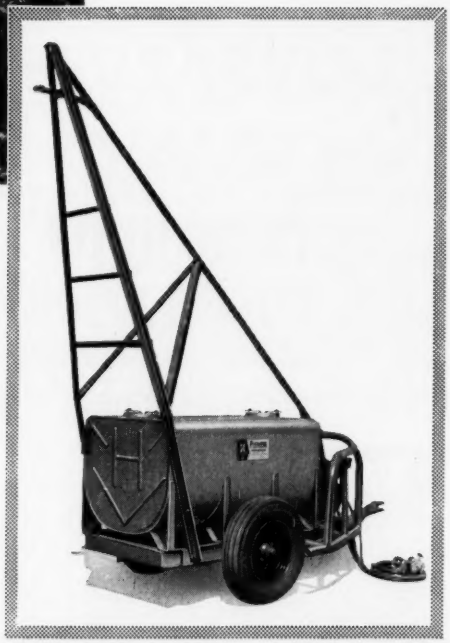

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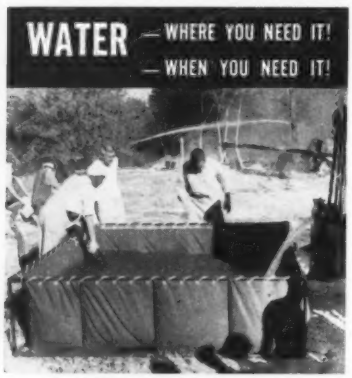

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Multiple Use and the Forester

The term multiple use has been used in forestry terminology for many years. Secretary of Agriculture Wilson in his letter to Gifford Pinchot recognized that there would be multiple demands upon the national forests which would be conflicting in some instances. He therefore announced in this letter the policy that these conflicts would be resolved so as to provide for the greatest good to the greatest number in the long run. The first quarter-century of management of these public lands involved to a large extent a program of organizing for protection and administration. The western national forests were largely inaccessible and the pressure of use and of intensive management was not great. The term multiple use was used to denote a concept of management. As opportunity for intensive use of the national forests began to develop with the construction of roads and the demand for timber, recreation, water, and forage, this term was used more loosely to identify practice of management. It came to have different meanings to different people.

Multiple use, however, is a concept of land management. It is not a system of management. As a concept it is not subject to a universal and precise meaning. The application of this concept to the management of land requires the coordination of use to the end that greater returns to the owners are obtained than if the land was managed for the resources or uses independently of one another and without coordination.

In applying the concept of multiple use to a given area, the objectives of management must be known and understood. The coordinated program of management must serve the objective of ownership. Consequently there will be some differences in the application to public and private land. The people of the United States are the owners of the national forests. They are interested in timber supply, water supply, recreation, hunting and fishing, and the grazing of domestic livestock on these lands. The coordination of management requires an appraisal not only of the economic values to be obtained, but intangibles as well. The objective of private ownership is generally to obtain a profit. The attainment of that profit may require the consideration of the public interest in hunting and fishing and recreation and in good water supply. Coordination of management becomes essential in order to maximize the net profit which may be realized in the long run.

We are witnessing in this country a phenomenal increase in population, particularly since World War II. Greater populations are forecast, with between 275 and 300 million anticipated by the year 2000. The demand, therefore, for all of the services and goods from land inevitably must increase. The needs of people for timber products will lead to more pulp mills, more plywood plants. Technology will undoubtedly show the way to additional uses for wood, and these processing and marketing opportunities will make possible the practice of an increasing intensity of forest management.

There will be greater demand for recreation, with increased leisure time and larger numbers of people. Rec-

(*Continued on page* 701)

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reational use on the national forests has been increasing at the rate of 10 percent a year since about the middle of the 1940's. The number of hunting and fishing licenses issued each year increases, and the demands for water for power, irrigation, and domestic use grow steadily.

Conflicts are bound to arise as these uses become competitive on areas where more than one resource exists. For example, timber may be associated with scenic beauty or be located on steep hillsides which form important watersheds. The forester's job is to resolve these conflicts so as to best serve the objectives of management.

The first step in applying the multiple-use concept to a given area in order to best serve the objectives of management is an assessment of all of the facts relating to the area. The manager must understand what resources are available, what is the volume of timber, what are the timber types, what is the nature of the geology and the soil, what are the areas of better-than-average scenic and natural beauty, what forage is available, and what is the relationship of the water supply to the related communities and industries. Any program of coordination of use must work with nature and not against it. The land manager cannot maximize his returns by trying to grow timber in areas better suited for the production of forage.

Having assembled this information, the next step is the analysis. The forester must assess cost and returns from each of the various resources as well as the additional costs which may be necessary to obtain a harmonious combination of uses. This analysis must be related to the objectives of management, and the final step is the establishment of management directives to guide use programs so as to obtain for the owners the greatest sum total of value from the area. For public lands, intangibles frequently are extremely important, and the assessment of these values becomes matters of judgment which are arrived at from an understanding of a resource situation and the interests of ownership.

The application of the concept of multiple use in land management for all ownerships is becoming important as a means for maximizing the returns to ownership. The process of applying this concept in management requires the highest of professional ability. In the hands of the forester rests the opportunity to obtain through a program of coordinated management the greatest good to the land owner and to society in the long run.

J. HERBERT STONE

Policy on Wilderness Preservation

The following statement is repeated from the "Report of the Council Meeting" held March 17-18, 1958, published in the Society Affairs Section of the May, 1958 JOURNAL.

During the past three years various proposals, together with specific bills, have been made to the Congress that legislation be enacted to establish a national wilderness preservation system and a National Wilderness Preservation Council.

Following considerable discussion of the proposals and after examination of the latest Senate bill, the Council unanimously adopted the following policy, on motion by Dr. Davis, seconded by Dr. Vaux.

"The Council of the Society of American Foresters reaffirms its support of the concept of multiple use of forest and other wild lands, as approved by referendum of the membership in 1947. The Council believes that wilderness is a proper part of a program of multiple use for public lands. Furthermore, the Council believes that the determination of areas suitable for wilderness and the boundaries thereof are responsibilities and functions of the personnel charged with administration of these lands."

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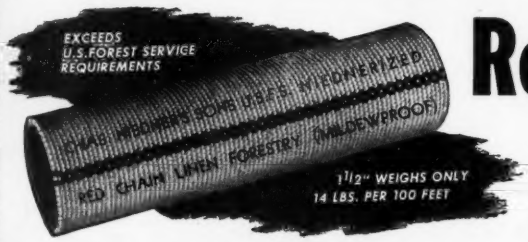

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Accreditation Continued for Utah State University

During April 1958, a committee of the Society (H. G. Wilm and Henry Clepper) participated in a revaluation of Utah State University at Logan as part of a larger visiting committee of 23 examiners representing the Northwest Association of Secondary and Higher Schools. Six professional accrediting societies were represented.

The report of the visiting committee was then reviewed by the SAF Committee for the Advancement of Forestry Education. The members are George B. Hartman, C. M. Kaufman, W. F. McCulloch, Ernest Wohletz, and H. G. Wilm, chairman. They recommended that the accredited status of Utah State University for professional forestry instruction be continued.

Accreditation is by vote of the Council, acting on the recommendation of this Committee. Since the Committee's recommendation was unanimous, the Council voted by mail ballot to continue Utah State University on the Society's accredited list. Forestry instruction is centered in the College of Forest, Range and Wildlife Management of which L. M. Turner is dean.

Criteria for Management of Natural Areas

A natural area must be protected against encroachments and actions which in themselves or indirectly would modify existing conditions and influence changes, if such area is to be of value for observation and research on forest and plant succession, plant associations, habitat requirements of species, insect and fungus depredations, soil microbiology, phenology and related phenomena. Management must consider all aspects of the biotic complex comprising the natural area. The criteria for management of natural areas are guide lines for protection against encroachments. When in doubt what to do, leave the area alone.

Identification.—The natural area should be identified in the administrative records as to purposes and objectives. Consideration should be given to marking the boundary for the convenience of management and research personnel. Signs which would tend to attract sightseers, recreational and casual visitors should be avoided; however, if the roads or trails pass along the boundary or through the natural area, limited posting may be needed to minimize encroachments.

Fences.—Natural area boundaries may require fencing for protection against domestic livestock and other unwanted usage that would result in environmental changes. Fences may be needed for enclosing study plots.

Publicity.—Publicity through professional sources at national, regional, state, university, or local levels to apprise professional research workers such as foresters, botanists, zoologists, etc., as to the location, forest type, and administering agency, is essential in the interest of making proper use of the natural areas. Publicity other than the foregoing should be avoided.

Physical improvements. — Generally speaking, no physical improvements such as roads, trails, fences, or buildings, except minor structures required to house or protect instruments or tools used by specific research projects, should be permitted within a natural area. Except as essential to fire protection of adjoining lands, the construction of buildings, roads, or trails should be discouraged at or on the boundaries of a natural area.

Existing roads needed for administrative purposes, including the management of contiguous lands, or to facilitate research, and which do not impair the function of a natural area, may be maintained; however, such maintenance, including the removal of dead and down timber should be limited to a strip not exceeding 30 feet either side of the center line of such roads.

Public use.—Picnicking, camping, berry, nut or herb gathering, plant collecting, and other public uses would contribute to modification of a natural area and may impair or limit the value of a natural area for research purposes. These uses should be discouraged or expressly prohibited if they represent a serious threat of encroachment. Hunting, trapping, and fishing

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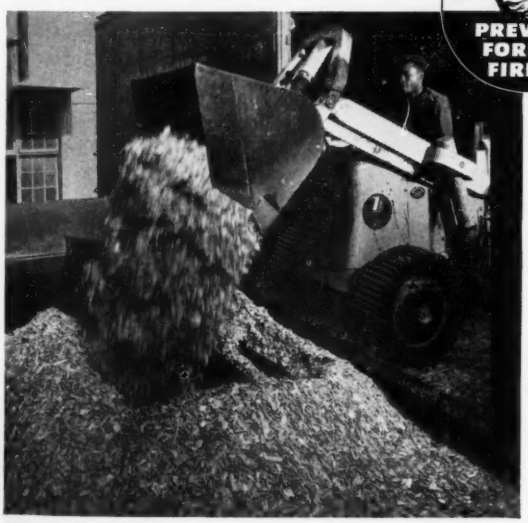

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may be permitted if the intensity of such activities will not have a significant effect on the biotic communities. Restrictions in addition to those normally existing under the prevailing game regulations should be provided if it is determined by competent professional authority that such restrictions are necessary to provide the normal animal populations consistent with environmental conditions.

Protection.—All wild fires originating within or adjacent to a natural area should be brought under control as quickly as possible. If a fire burns within a natural area no cleanup or fire hazard reduction should be undertaken, nor reforestation undertaken, unless the utility of such area has been seriously impaired and it is to be dropped from the natural area classification.

No control of insects or disease should be instituted unless it is conclusively demonstrated by recognized entomologists or pathologists that the infestation or infection distinctly threatens to destroy the timber type within the natural area and jeopardizes adjacent forests. Individual insect- or disease-killed trees are a part of the natural forest and should not be disturbed on a natural area, except as a specific research project may so require.

Bird and mammal populations will not usually be subject to direct control except as a specific research project may so require.

COMMITTEE ON NATURAL AREAS
Society of American Foresters
John F. Shanklin, *Chairman*

Coming Events

North American Forest Soils Conference

The North American Forest Soils Conference is scheduled for September 8-11 on the campus of Michigan State University, East Lansing.

CIF to Hold 50th Anniversary Meeting

The Canadian Institute of Forestry will hold its 50th Anniversary annual meeting October 7-9, 1958, at Fredricton, New Brunswick.

Concurrently, the week of October 5-11 will mark the Golden Jubilee celebration of the Faculty of Forestry of the University of New Brunswick.

National Watershed Congress

The Fifth National Watershed Congress will be held this year at the Statler-Hilton Hotel, Dallas, Tex., on September 29-30, and October 1. The meeting is open to all persons.

Soil Conservation Society

City Auditorium, Asheville, N. C. will be headquarters for the 13th annual meeting of the Soil Conservation Society October 19-22.

American Forestry Association

The 83rd annual meeting of the American Forestry Association will be held in Tucson, Ariz., October 27-30, 1958. Headquarters will be the Pioneer Hotel. Meeting theme: "Water, Forests, and People."

Committee Recommends Certified Seed Program

Recently the Tree Improvement Committee of the Appalachian Section, Society of American Foresters, drafted a statement on the need for

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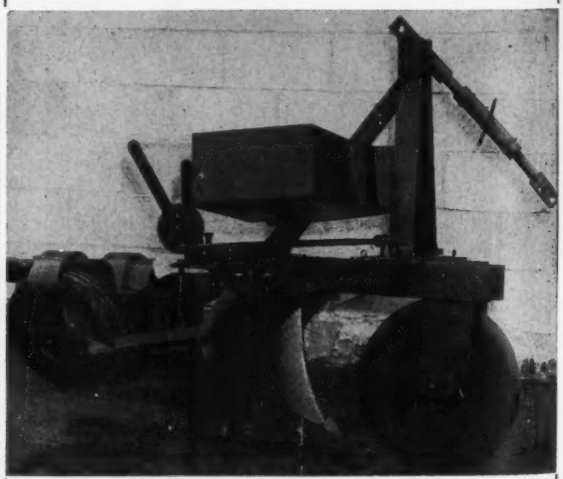

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CONTOUR TRANSPLANTER
MODEL 54-BA
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certifying seed used in producing forest tree seedlings for planting by public and private landowners.

Georgia has already passed a law covering forest tree seed certification. The program is being handled by the Georgia Crop Improvement Association. South Carolina is now in the process of considering such a step.

Underlying reasons for such a program and some of the features it should cover are outlined in the committee's statement as follows:

"Forestry in the South can get along without seed certification this year, and probably for a few years hence. However, unless plans are started now, and are concretely developed in a short time, chaos in the seed market will develop. Two major difficulties will occur, each of which is serious: (1) Unscrupulous individuals or organizations will take advantage of the current interest in genetics and will turn a pretty penny riding on false implications, if not outright false claims. This has already shown up in a minor way at several places in the United States. It was evident in horticulture until the states were forced to take action. It is a well known fact that in agriculture, and to an increasing extent in forestry, the word hybrid and genetics carry some sort of "starry-eyed" idea of huge increases in yields. Already some of the less well informed are demanding hybrids 'I don't care what kind.' It is not the appropriate place to mention definite situations here, but some terrific examples of 'finger burning' from this attitude can already be pointed out in the South. (2) The nurseries will suddenly awaken to demands for seedlings from certified seeds. Many nurseries in the South apparently have taken a 'wait and see' attitude. By the time they can see, it will be to late, for this business of forest tree certification must develop slowly with a great deal of care. It appears obvious to some of us that a partial reason for the very large increase in privately owned nurseries is a trend in the direction towards obtaining desired control of seed source.

"How controlled.— We wish to see seed certification develop freely and cooperatively with the absence of controlling laws. If such cooperative development between the states, industries and small landowners does not take place, we one day may find ourselves in the situation that exists in some European countries, i.e., all seed and seedling sales are very strictly regulated by federal law and seed can be sold only from 'licensed' stands. It is illegal to even give away seed from a non-accepted stand. Therefore, if forced regulation is to be avoided, voluntary action must be started. We feel that the burden of early organization and coordination must fall on the state nurseries, thus the state foresters. Certification standards must be worked out that are mutually satisfactory between states and applicable between states. In this, an attempt to have strictly in-state standards are not satisfactory where there is so great an overlap in collection areas.

"Certification of what?—What should be certified? Of course, the standard physical qualities of germination percent, seeds per pound, purity, etc. should be. In addition, however, the species and the state and county of collection need be certified. The site from which collection is made needs to be stated, i.e., coastal plain, Piedmont, sand hills.

"In the near future, genetic certification will be necessary from:

1. Type of stand, if open collected.
2. Seed production area.
3. Seed orchard.

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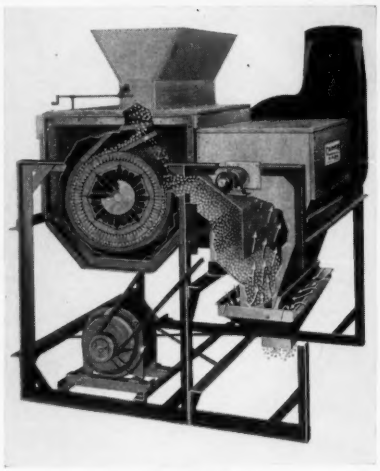

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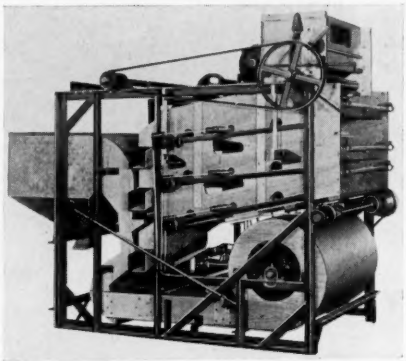
are ideal for pre-cleaning of tree seeds and removing excessive amounts of inert material. These 3-screen cleaners provide a rough scalping operation, a closer scalping with the second screen and removal of the smaller materials with the third screen. An accurate air separation removes light weight foreign material. They require small floorspace and low horsepower.

Following dewinging, the A-Models can also be used for final cleaning and grading to produce highest quality planting stock.



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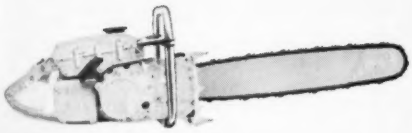

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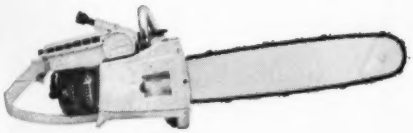
New design provides 7 horsepower. Gear-drive Super 55A produces more brute force at the chain than any other saw its weight. Blades up to 42"; also 15" plunge bow. New muffler kills "bark."

SUPER 44A
Redesigned to provide 7 horsepower — more power-per-pound than any other saw. Weighs only 19 pounds. Exclusive new muffler kills fatiguing saw "bark." Blades up to 42". Direct-drive.



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CHAIN SAWS

4. Individual tree with specific characters.

"The above gives a general idea of what needs to be known. Seed needs to be certified whether it is special seed or common seed. We are not attempting to force everyone to buy seed of a set standard—we want everyone to know what he is buying. For example, if a buyer does not care about source or type of tree from which he gets seed, his certification grade should state, in effect 'Seed of loblolly pine, collected wherever possible, from any type tree possible, no genetic certification given.' If a buyer wants to get seed for a special purpose, and is willing to pay to get it, his standard could read 'Loblolly pine, from x seed orchard, high specific gravity wood, special fast growth, adapted to grow in shallow Piedmont soils, etc.' Of course, the actual standards will be more refined in language than the above illustrations, but the buyer must be able to know what he is getting, whether genetically select or run-of-the-mill material.

"What has been done.—In the South generally, with one exception, nothing has been done. Georgia has a set of seed certification standards drawn up. Since such standards must apply across state boundaries, it is suggested that the state foresters take the initiative and work through the Tree Seed Certification Sub-committee of the Southern Forest Tree Improvement Committee. This SFTIC is southwide in scope, is represented by all types of agencies, so should be able to do the work. Present head of the SFTIC is E. G. Wiesehuegel, Division of Forestry Relations, Forestry Investigation Branch, Tennessee Valley Authority, Norris, Tenn.

"Professional ethics.—The subject of seed certification brings out one of the main considerations for a forester, i.e., professional ethics. Nursery and seed collection is a vital area where ethical considerations should be taken into account. There is a difference in seeds and seedlings and it is the duty of those in charge of seed and seedling production to make this information available to the purchaser. This is made possible through seed certification."

TREE IMPROVEMENT COMMITTEE[1]
Appalachian Section,
Society of American Foresters

[1]Lee Chaiken, J. Ennis, David Fortgang, P. A. Griffiths, Duncan Harkin, Ray Marler, Howard Scott, Robert Shipman, Bruce Zobel, *chairman.*

Upper Mississippi Valley Section Holds Meeting

The summer meeting of the Upper Mississippi Valley Section was held July 17 and 18 on the Superior National Forest, Minnesota, under the sponsorship of the Lake Superior Chapter.

Featured on the program of the first day was a tour of private forestry operations and visits to Forest Service developments, both administrative and research. In the evening there was a dinner in the Ely community center, attended by 150 members, their ladies, and guests.

William Heritage of the Bureau of Indian Affairs was presented with a plaque and a framed picture as a mark of esteem on his forthcoming retirement. Henry Clepper reported briefly on Society affairs.

A Section business meeting was held on Friday morning, July 18. Chairman Earl J. Adams presided.

A report on the proposed foresters' registration law was presented by A. F. Ennis for the Professional Status Committee.

Donald P. Duncan reported on the forestry program for Minnesota. Additional reports were made by Secretary-Treasurer Bernard Granum and John Hubbard, membership chairman.

S. T. Dana discussed briefly the study of forest land ownership in Minnesota, a project of the American Forestry Association.

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OF SCIENTIFICALLY TRAINED MEN

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Appalachian Section Adds Chapter

Blue Ridge Chapter, the fourth and newest Chapter of the Appalachian Section, was presented its charter by Section Chairman H. F. Lathrop at the Virginia Sub-Section summer meeting held July 11-12 on the Jefferson National Forest.

Officers of the new Chapter are: David V. Smith, chairman; Ray Hendricks, vice-chairman; and A. B. Lyon, secretary-treasurer.

SAF members residing in the following counties are invited to participate in the Chapter's activities: Alleghany, Amherst, Bath, Bedford, Bland, Botetourt, Campbell, Carroll, Craig, Floyd, Franklin, Giles, Henry, Montgomery, Patrick, Pittsylvania, Pulaski, Roanoke, Rockbridge, and Wythe.

Inland Empire Section Meets in Idaho

State Forester Roger Guernsey, Idaho State Forestry Department, and his staff were hosts to the Inland Empire Section at its spring meeting in June at Priest Lake, Idaho.

A panel consisting of Mr. Guernsey; Art Wilson, state land commissioner; Jack Emmery, state superintendent of parks; Earl Ploure, deputy state foresters; and Edward Ring, in charge of fire in North Idaho for the state forestry department, discussed their various roles in the administration and function of state lands.

Newly elected officers for the Section are Chairman George Weyerman, supervisor of the St. Joe National Forest; Vice-chairman Bruce Colwell, forester for the Ohio Match Company; and Secretary-treasurer Jack Gillette, forester for the State of Idaho.

Mr. Colwell is also chairman for the

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membership committee. James Anderson, forester for the Inland Empire Paper Company, is program chairman.

SAF Consulting Foresters Directory to Be Published

Persons and firms listed in the SAF Consulting Foresters Directory published in the January 1958 JOURNAL OF FORESTRY have been requested by mail to approve, correct, or revise their listings for the new directory to be published in the January 1959 JOURNAL.

Members doing consulting forestry work and whose names have not previously appeared are invited to apply now for listing. They should provide complete information following the form used in the List of Consulting Foresters published in the January 1958 JOURNAL OF FORESTRY. Society membership is a prerequisite for listing. Such members must be in good standing, i.e., have paid their 1958 dues. Consulting firms will be listed if one or more of the partners or employees are members of the Society.

November 1, 1958 is the last date on which listings will be accepted for publication in the January 1959 directory.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of July are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of October 1958.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

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Junior Grade

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY
Slagle, R. E.

Appalachian Section

Junior Grade

Wiegand, W. E., consulting forester, Conway, S. C.; Univ. of Ga., BSF 1950.

Affiliate Grade

Perry, J. D., forest tech., Int'l Paper Co., Marion, S. C.

Pope, G. M., land examiner, Bowaters Carolina Corp., Catawba, S. C.

William W. Mitchell (1903-1958)

William W. Mitchell, age 54, personnel officer, Forest Products Laboratory, Forest Service, Madison, Wis., passed away suddenly Wednesday, June 25.

Mr. Mitchell was born at Ontario, Calif, September 27, 1903. He graduated from the University of Idaho School of Forestry in June 1928 and ten years later received the L.L.B. degree from George Washington University, Washington, D. C.

Mr. Mitchell spent his entire forestry career with the Forest Service. He held membership in the Society of American Foresters, American Society for Public Administration, and the Forest Products Research Society.

Central Rocky Mountain Section

Junior Grade

Students Eligible for Automatic Advancement

COLORADO STATE UNIVERSITY
Kline, J. D.

Member Grade

Brown, D. L., dist. forester, Colorado State Forest Service, Montrose, Colo.; Colo. State BSF 1952 (Junior 1951).

Gulf States Section

Junior Grade

Bozeman, C. A., dist. forester, Rolling Fork, Miss. (Affiliate 1952).

Curlin, J. W., forester, Int'l Paper Co., Minden, La. (Affiliate 1956).

Maxwell, R. E., forester, Int'l Paper Co., Jena, La.; LPI, BSF 1954.

Turnley, J. E., forester, Int'l Paper Co., Jena, La.; LSU, BSF 1949.

Member Grade

Akin, J. W., dist. forester, Southwestern Settlement & Development Co., San Augustine, Tex.; LPI, BSF 1951 (Junior 1954).

Henderson, J. W., forester, T. L. James & Co., Inc., Ruston, La.; LPI, BSF 1951 (Junior 1954).

Sims, J. R., P. O. Box 22085, Houston 27, Tex. (Reinstatement).

Affiliate Grade

Henson, R. C., mgmt. forester, Grenada, Miss.

Hubbard, M. I., P. O. Box 277, Zwolle, La. (Reinstatement).

McCauley, J. M., dist. forester, Tremont Lbr. Co., Chatham, La.

Mills, F. W., forestry aide, Oxford, Miss.

Inland Empire Section

Junior Grade

Gillette, J .E., Office of State Forester, Box 38, St. Maries, Idaho (Reinstatement).

New England Section

Affiliate Grade

Sheehan, W. A., asst. county forester, County Extension Office, Rochester, N. H.

New York Section

Junior Grade

Van Aken, R. C., US Army, Fort Gordon, Ga.; State Univ. of N. Y., BSF 1956.

Students Eligible for Automatic Advancement

STATE UNIVERSITY OF NEW YORK
Damoth, F. E.

Member Grade

Axtell, A. G., consulting forester, Glens Falls, N. Y.; Univ. of Maine, BSF 1942 (Junior 1954).

Northern California Section

Member Grade

Caster, P. B., asst. forester, Scott Lbr. Co., Inc., Burney, Calif.; Univ. of Calif., BSF 1954 (Junior 1954).

Northern Rocky Mountain Section

Affiliate Grade

Edwards, H. O., forester, Dept. of Interior, Yellowstone Park, Wyo.

Howell, O. B., asst. prof. of forestry, Mont. State, Missoula, Mont.

Ozark Section

Junior Grade

Smart, D. G., farm forester, Mo. Cons. Comm., Kirksville, Mo.; Mich. College of M & T, BSF 1953 (Affiliate 1956).

Member Grade

Ray, H. C., P. O. Box 431, Fayetteville, Ark. (Reinstatement).

Wengert, R. H., asst. dist. ranger, USFS, Danville, Ark.; Purdue, BSF 1952 (Junior 1952).

Affiliate Grade

Benson, R. T., Forester, Fordyce Lbr. Co., Fordyce, Ark.

Bratton, L. J., forester, Int'l Paper Co., Sheridan, Ark.

Moore, R. J., forester, Int'l Paper Co., Sheridan, Ark.

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON
Prater, C. D.

Junior Grade

Johnston, H. C., dist. forester, Milwaukee Land Co., Forks, Wash.; Wash. State, BSF 1950 (Affiliate 1952).

Southeastern Section

Student Grade

UNIVERSITY OF FLORIDA
Bollinger, R. W.
UNIVERSITY OF GEORGIA
Johnson, H. H.

Junior Grade

Moses, F. H., forester, Florence, Ala.; Univ. of Fla., BSF 1949.

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UNIVERSITY OF FLORIDA

Laird, J. S.

Member Grade

Morrow, W. H., asst. forester, U. S. Pipe & Foundry Co., Birmingham, Ala.; Univ. of Ga.; BSF 1949 (Junior 1954).

Nitz, J. H., dist. ranger, USFS, Andalusia, Ala.; Univ. of Minn., BSF 1950 (Junior 1953).

Affiliate Grade

Hopkins, M. L., ranger, Rayonier Inc., Hortense, Ga.

Upper Mississippi Valley Section

Junior Grade

McDevitt, R. J., area forester, Minn. and Ontario Paper Co., International Falls, Minn. (Affiliate 1946).

Pasieznyk, W. L., farm forester, N. D. School of Forestry, Lisbon, N. D.; Mont. State, BSF 1957.

Students Eligible for Automatic Advancement

UNIVERSITY OF MINNESOTA

Blackbourn, R. A.

Affiliate Grade

Bormanis, A., forester, Iron Range Reservation & Rehabilitation Com., Hibbling, Minn.

Campbell, J. C., pulpwood buyer, Campbell Lbr. & Tbr. Co., Duluth, Minn.

Wisconsin-Michigan Section

Student Grade

MICHIGAN STATE UNIVERSITY

Hatch, W. R.

Junior Grade

Montambo, K. R., forester, Wis, Cons. Dept., Tomahawk, Wis.; Mich. College of M & T, BSF 1955.

Students Eligible for Automatic Advancement

UNIVERSITY OF MICHIGAN

Bruce, R. D.

Member Grade

Nelson, N. O., asst. supv. USFS, Ironwood, Mich. (Reinstatement).

Affiliate Grade

McIver, M., forester, Brimley, Mich.

No Section

Corresponding Member

Fukuda, S., 883 Kuchiawano, Oaza, Awano-Machi, Kamitsuga-gun, Tochigi Prefectural, Japan.

Hirano, K., 3 Sugizuma-cho, Fukushima City, Fukushima Prefectural, Japan.

Ishitani, S., 396 Chizu, Chizu-cho, Yazugun, Totteri Prefectural, Japan .

Kayin, N., 39 Sokak #33 Guzelyali, Izmir, Turkey.

Khosrovi, H., general manager, Gilan Wood Industry Co., Ministry of Agriculture, Iran — Tehran, College of Agric., BSF 1943.

Kishi, E., 325, Kaneyama-cho, Mogamigun, Yamagata Prefecture, Japan.

Miyoshi, M., 1090 Tosei Nishi-ura, Tsu City, Mie Prefecture, Japan.

Yokoi, J., 639, Nakashima, Oaza, Nakagun, Nakagawa-cho, Tokushima Prefecture, Japan.

Yokose, M., 368, 4-ku, Higashi-machi, Tottori City, Japan.

Forestry News

Forest Conservation Stamp to Be Issued

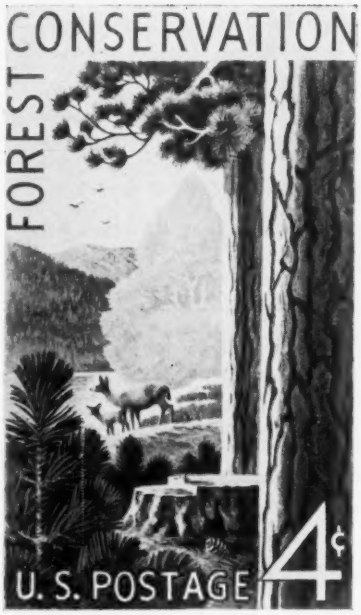
The 4-cent Forest Conservation commemorative stamp, which goes on first-day sale on October 27, 1958, at Tucson, Ariz. at the annual meeting of the American Forestry Association, will be printed in three colors—yellow, brown, and green. The stamp, 0.84 by 1.44 inches, arranged vertically, features the major aspects of forest conservation, including new growth of young trees and the harvesting of mature timber under scientific forest management; home and shelter for wildlife and birds; and protected watersheds.

This first forest conservation stamp in history commemorates the 100th anniversary of the birth of Theodore Roosevelt. It also salutes the many private and public agencies which have played a large part in the progress made in the protection and wise use of the nation's natural resources.

The Forest Conservation stamp was designed by Rudolph Wendelin, staff artist for the U. S. Department of Agriculture. Mr. Wendelin has specialized in art and illustrations of forestry conservation and was given a Superior Service Award in 1957 by the Department of Agriculture for outstanding excellence in this field.

Collectors desiring first day cancellations may send addressed envelopes to the Postmaster, Tucson, Ariz., together with money order remittance to cover the cost of the stamps to be affixed. An enclosure of medium weight should be placed in each envelope and the flap turned in or sealed. The outside envelope to the Postmaster at Tucson should be endorsed "First Day Covers Forest Conservation Stamp." *Collectors should bear in mind that this is a vertical stamp and envelopes should be addressed in the lower left corner, particularly when blocks are desired.*

The first day cancellation at Tucson will portray the head of "Smokey Bear" and the wording "Keep America Green."



Fire Research Laboratory Plans Announced

Plans for construction of a forest fire laboratory at Missoula, Mont., have been announced by the U. S. Forest Service. Director Reed W. Bailey of the Intermountain Forest and Range Experiment Station stated that the new research facility will be named the Northern Forest Fire Laboratory.

Development of the laboratory and its research program will be under supervision of Jack S. Barrows, chief of Intermountain Station's division of forest fire research at Missoula.

The laboratory will conduct basic and applied research as part of a na-

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tional program for developing new and improved methods of forest fire control. The staff will include foresters, meteorologists, engineers, chemists, and physicists.

The laboratory building will be on federal land at the site of the Forest Service Aerial Fire Depot at the Missoula airport, 7 miles west of the city.

The installation will be close to and will work closely with the U. S. Weather Bureau Fire Weather Forecasting Center near Missoula. Forest Service research meteorologists will use information gathered by the radar unit in studying lightning, winds, and other weather phenomena related to the start and spread of forest fires and will cooperate closely, as in the past, with scientists of the U. S. Weather Bureau. The Munitalp Foundation, Inc., of New York City is expected to continue its cooperation in fundamental forest fire meteorological research. This foundation has assisted in forest fire research during the past five fire seasons, particularly in studies of lightning-caused fires.

Regional Forest Biology Laboratory to Be Established in Ohio

Research on midwestern forest biology problems will be conducted at a new laboratory to be established by the U. S. Department of Agriculture north of Columbus, Ohio. Provided for recently by Congress, the laboratory is the first of four such research facilities planned for various parts of the country. Research will be conducted jointly by the U. S. Forest Service and the Agricultural Research Service. The unit will be administered as a part of the Central States Forest Experiment Station, Columbus. Dr. W. G. McGinnies, director of the Experiment Station, said a 15,000-square-foot building will be constructed, containing offices and laboratories for about 15 scientists.

The laboratory will serve the North-Central region of the country and will be devoted chiefly to basic research in the fields of forest insects and diseases. This work will be headed up by Russell R. Whitten, chief of the station's Division of Forest Insect Research and by Dr. Carl E. Seliskar, chief of the Division of Forest Disease Research. In addition, insect and disease pests of ornamental trees will be studied in a special section under the direction of Roger U. Swingle, pathologist, of the Agricultural Research Service. Construction of the laboratory is to begin next spring and the building is scheduled for completion in 1960.

Industrial & Private

Vertrees Young to Director Post

Vertrees Young of Bogalusa, La., was recently elected a director of Crown Zellerbach Corporation, replacing Joseph M. Arndt of St. Louis, Mo., who retired from the company's 19-member board. Mr. Young is vice president of Crown Zellerbach and general manager of mill and timber operations of the Corporation's Gaylord Container Division.

Edwin J. Spiegel, senior vice president of Crown Zellerbach and general manager of the Gaylord division, announced that Mr. Young retired from active, day-to-day management duties on July 31, 1958 at the age of 65 in accordance with the standard retirement procedure for Crown Zellerbach Corporation and its divisions.

Carrying out the future plans for the three top Gaylord executives outlined at the time of the 1955 merger into Crown Zellerbach, Mr. Young will still be closely concerned with the business in a consulting capacity in addition to his active participation on the Board of Directors. In a similar manner, Mr. Arndt became a consultant after his retirement from active management in May 1957—and he will continue to serve as a consultant after his retirement from the board.

Following Mr. Young's retirement, W. F. Gillespie continues as general manager of the Bogalusa mill operations including the mill's wood procurement activities. H. L. Custer will continue as general manager of the Dresden and Baltimore, Ohio, mills. The operation of all Gaylord mills will be under the executive supervision of E. W. Erickson, Crown Zellerbach's vice president for manufacturing. Similarly, P. M. Garrison will continue as manager of timber operations for the Gaylord division forest lands in Louisiana and Mississippi. These operations will be under the executive supervision of D. S. Denman, Crown Zellerbach's senior vice president for timber.

Heads Wood Promotion Program

Mortimer B. Doyle, executive vice president of the National Lumber Manufacturers Association, has announced the appointment of Loren F. Dorman as director of advertising and merchandising for the NLMA with specific responsibilities in connection with the newly created nation-wide wood promotion program of the lumber industry.

Prior to accepting his new post, Dorman was advertising manager and assistant director of public relations for the Weyerhaeuser Timber Company, Tacoma, Wash.

T. R. Sheldon Assumes Post on Dennis Retirement

Henry M. Dennis, assistant vice president of Scott Paper Company and manager of the Timber Division of the company's West Coast Division, retired from his position on July 1. He will become a consultant to the company.

T. Robert Sheldon, assistant to Mr. Dennis, assumed full responsibility as manager of the West Coast Timber Division activities effective with the retirement. Sheldon joined the Division in 1956. A graduate of the New York State College of Forestry he also holds a master's degree from that institution. During his Naval service from 1942 to 1946, he was assigned to the Lumber Board of the War Production Board.

Industry Merger Announced

St. Paul and Tacoma Lumber Co. merged with and into St. Regis Paper Co. on June 30, 1958.

The lumber manufacturing, plywood, retail yard, and store businesses of the St. Paul and Tacoma Lumber Co. are now operated as the St.Paul and Tacoma Lumber Co., Division of St. Regis Paper Co., with offices at 1220 St. Paul Avenue, Tacoma, Wash.

The logging operations of St. Paul and Tacoma Lumber Co. are consolidated with similar present operations of St. Regis Paper Co., and both operations will be carried on as St. Regis Paper Co., Logging Department, with its office at 1216 St. Paul Avenue, Tacoma, Wash.

C. of C. Reappoints Resources Committee Chairman

Reappointment of David L. Francis, president of the Princess Elkhorn Coal Company, Huntington, W. Va., as chairman of the Natural Resources Committee, Chamber of Commerce of the United States, has been announced by chamber president William A. McDonnell. Mr. Francis is also a director of the Chamber.

With representation from all parts of the country, the 44-member committee helps to guide National Chamber policy on issues affecting coal, elec-

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Committee members concerned with forestry are Howard D. Bennett, Appalachian Hardwood Manufacturers, Inc.; Hardin R. Glascock, Jr., Western Forestry & Conservation Assoc.; Dave James, Simpson Logging Co.; Peter D. Joers, Dierks Forests, Inc.; Bernard L. Orell, Weyerhaeuser Timber Co.; and Earl Porter, Southern Kraft Division, International Paper Co.

C. R. Binger Assistant to Head of Minnesota-Ontario Company

C. R. Binger, general manager of the National Pole and Treating division of Minnesota and Ontario Paper Company, was promoted to assistant to the president of the company, effective July 1.

Einar T. Erickson, industrial sales representative for the company's Insulite division, was named to succeed Binger as general manager of National Pole and Treating.

Both executives will continue to make their headquarters in Minneapolis.

Binger was assistant general manager of the National Pole and Treating division prior to his promotion to the managership November 1, 1957. He joined Mando as a forester in 1946 and in 1948 became assistant to the director of forest management. From 1952 until his transfer to National Pole in Minneapolis, he was forest management officer for Mando's Canadian subsidiary, The Ontario-Minnesota Pulp and Paper Co., Ltd., with headquarters in Fort Frances, Ont. He is a graduate of the University of Minnesota's school of forestry and holds a master's degree from Yale University.

Pulp and Paper Foundation Scholarships Mount

The Scholarship Committee of the Pulp and Paper Foundation, Inc., has awarded 55 scholarships totaling $91,550 to students in the school of forestry at North Carolina State College.

In reporting this, Professor C. E. Libby, head of the Pulp and Paper Technology Curriculum in the college's School of Forestry, said 30 scholarships for students already enrolled at the college were renewed and 25 freshmen or students transferring from other institutions were awarded new scholarships.

The annual value of the renewed scholarships amounts to $18,550, and the annual value of the new scholarships totals $11,950, Professor Libby said. Total annual value of the 55 awards is $30,500 or a grand total covering the remaining years of study for the recipients of $91,550.

The scholarships range in value from $300 to $750 per year.

Public

Howard Hopkins, Assistant Chief of Forest Service, Retires

Howard Hopkins, assistant chief of the Forest Service since 1947, retired June 30 after more than 35 years of service.

Mr. Hopkins started his Forest Service career in 1923 in Colorado. Subsequently, he served as forest supervisor in Minnesota, as assistant regional forester in the East, and as associate regional forester in California. For several years prior to becoming assistant chief he was head of the Forest Service cooperative programs with the states and private landowners for increasing productivity of private forest lands.

He was also assistant director of the New England Timber Salvage Administration set up to harvest and market the timber thrown by the 1938 hurricane. During World War II Mr. Hopkins directed the Timber Production War Project, which helped speed up the production of lumber and other forest products for the war effort.

Mr. Hopkins was born in New Haven, Conn. in 1899. He received his B.A. degree from Yale in 1921 and his master's degree in forestry from there in 1923.

Shepherd Promoted to Intermountain Post

Weldon O. Shepherd of Washington, D. C., has been appointed chief of the Division of Range Management Research at Intermountain Forest and Range Experiment Station, according to announcement by Director Reed W. Bailey. Dr. Shepherd succeeds the late Lincoln Ellison who was killed last March by an avalanche while skiing at Snow Basin. During the interim Odell Julander has served as acting chief of the division.

At the time of his appointment, Dr. Shepherd was assistant chief range conservationist in the Forest Service Division of Range Management Research in Washington, D. C. He had been in the Washington Office since early in 1954.

California Station Expands Watershed Research

Transfer of two research workers and realignment of research projects to strengthen watershed management research by the U. S. Forest Service in California have been announced by Keith Arnold, director of the California Forest and Range Experiment Station.

Jesse D. Sinclair, formerly in charge of the San Dimas Experimental Forest, is being transferred from Glendora to the Station headquarters in Berkeley. In his new position, Sinclair will serve as technical assistant to Walt Hopkins, chief of the station's division of watershed management research.

Jay R. Bentley, currently assigned to Berkeley as leader of the cooperative fuel-break project, will become center leader in charge of watershed management and chaparral flammability studies at the Glendora office.

One plan to be worked out will set up coordinated brushland watershed research for all of California. Another will outline over-all watershed research projects for the entire California region.

Range Researchers Promoted

Appointment of Merton J. Reed to the position of assistant to the chief of range management research in the California Forest and Range Experiment Station was announced in July by Keith Arnold, director of the station, Berkeley. Reed transferred to the California Station from the Blue Mountain Research Center at Le Grande, Ore., a branch of the Pacific Northwest Forest and Range Experiment Station.

Promotion and transfer of George A. Garrison, leader of the Mid-Columbia Research Center at Wenatchee, Wash., to replace Reed was announced by R. W. Cowlin, director of the Pacific Northwest Forest and Range Experiment Station, U. S. Forest Service, Portland, Ore.

Eriksson Heads Timber Management in USFS Denver Office

Horace C. Eriksson, supervisor of the Ouachita National Forest, Hot Springs, Ark., has replaced Arthur L. Nelson as timber management division head in the Forest Service's Denver Regional Office. Mr. Nelson retired July 10 after 35 years with the Forest Service.

Eriksson is a native of Southbury, Conn., and a graduate of the University of Connecticut. Except for short periods and a tour of duty with a forestry unit of the army engineers in Africa and Italy during World War II, all of Eriksson's forestry work has been in the Southern region of the Forest Service.

Mr. Nelson headed the Division of Timber Management for 14 years.

Education

Bruns New Forestry Head at University of New Hampshire

Paul E. Bruns of Missoula, Mont., has been appointed chairman of the University of New Hampshire Department of Forestry. He succeeds Clark L. Stevens.

Professor Bruns received the A.B.

PAUL E. BRUNS

degree from New York University and the M.F. from Yale. Following graduation he served briefly with the Northeastern Forest Experiment Station and was for two years woodlands manager for a Vermont veneer company.

During the period 1947-1955 he was on the faculty of Montana State University School of Forestry, leaving to engage in consulting forestry.

He is the author of *Applied Forest Management.*

Duerr to Study Forest Resources in Pacific Northwest

William A. Duerr, chairman of the forestry economics department at the New York State College of Forestry, will spend about a year in the Pacific Northwest, making an economic analysis of trends and developments in the forest resource situation in western Washington, western Oregon, and northen California. The announcement was made by R. W. Cowlin, director of the Pacific Northwest Forest and Range Experiment Station.

Before joining the staff of the New York forestry college in 1952, Dr. Duerr worked 18 years for the U. S. Forest Service, chiefly in the South. His last Forest Service assignment was as assistant chief of forest economics research in the agency's Washington, D. C. office.

Dr. Duerr has a B.S.F. degree from Iowa State College, an M.S. degree in agricultural economics from the University of Minnesota, and a doctorate in economics from Harvard University.

Shipman Joins Clemson Staff

R. D. Shipman has been appointed associate professor of forestry at Clemson College, it was announced recently by Koloman Lehotsky, head of Clemson's Department of Forestry.

Dr. Shipman was formerly employed by the U. S. Forest Service, having worked in the Lake States Region and at the Southeastern Forest Experiment Station.

He received his B.S.F. and M.F. de-

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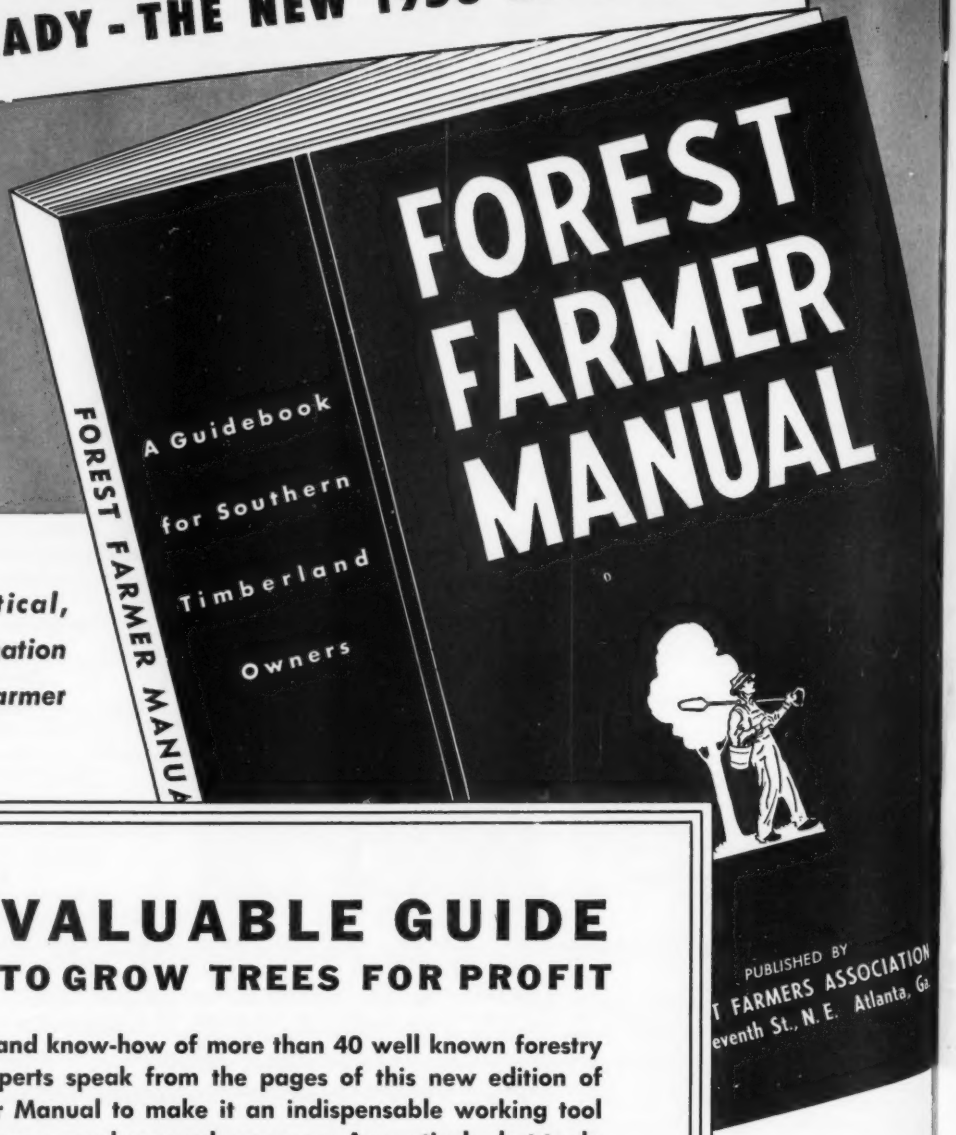

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grees at the University of Michigan in 1947 and his Ph.D. in forestry at Michigan State University in 1952.

Michigan University Holds Seventh Woodworking Course

University of Michigan's Department of Wood Technology was host to its seventh annual trouble shooting course for executives, plant personnel, equipment suppliers, and quality control men of the woodworking industry at the university August 4-8.

The teaching staff announced for the course included James S. Bethel, director of the Forest Products Laboratory, North Carolina State College, and from the University of Michigan's staff Glen P. Bruneau, supervisor, wood technology laboratory; Norman C. Franz, associate professor of wood technology; and Stephen B. Preston, chairman, Department of Wood Technology.

Allied

Forest Products Research Society Names New Officers

New officers for the Forest Products Research Society were announced during the annual business meeting June 24 in Madison, Wis. President for the coming year is W. Jeter Eason, vice-president, Nickey Brothers Inc., Memphis, Tenn. E. S. Harrar, dean, School of Forestry, Duke University, Durham, N. C., was elected president-elect. Elected vice-president was R. H. Berry, Scott Lumber Co., Burney, Calif.

J. J. Allegretti, director, product development, Masonite Corp, Chicago, was elected to a three-year term as North-Central Regional Board Member. F. E. Dickinson, director, University of California, Forest Products Laboratory, Richmond, was elected Southwest Regional Board Member.

Plans for Institute of Wood Engineering

As a first step towards professional affiliation for graduates of forest products curricula, a group of Forest Products Research Society members met at Madison, Wis. on June 22, and established the nucleus of a professional society with the tentative title of "American Institute of Wood Engineering."

A temporary constitution was adopted for the group. The elected officers were instructed to evaluate this tentative constitution and draw up a plan for a permanent organization within the next 2 years.

Because the objectives of the group are closely related to those of the Forest Products Research Society, the officers were instructed to seek means of affiliating with that Society.

The officers of the American Institute of Wood Engineering are:

President—Dr. J. S. Bethel, North Carolina State College;

Vice president—Dr. H. O. Fleischer, U. S. Forest Products Laboratory;

Secretary-treasurer—Dr. R. L. Youngs, U. S. Forest Products Laboratory;

Trustees—Dr. Fred Dickinson, California Forest Products Laboratory; Mr. A. F. Muschler, Edward Hines Lumber Company; Dr. A. J. Panshin, Michigan State University.

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Box G, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., in forest management 1956. Age 24, single. Will be released from Army service in October. Experience: Southeast. Desire position with private industry in the Southeast, preferably, Florida.
Box H, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F., 1955, University of Washington. Age 25, married, 3 years U.S. Air Force principally with M.A.T.S. 1500 hours. Commercial pilot, single and multi engine land, DC-6, DC-7, instrument. Restricted radiotelephone permit. Release from active duty, November 1958. Forestry experience in photo interpretation and cruising for stocking and taxation evaluation. Desire position utilizing aviation and forestry experience. Prefer western United States.
Box I, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B-S.F., 1950. Married, age 37, two children. Seven years experience in Forest Management. Single employment in Southern Forestry; pine and hardwood management. Presently employed; desire to relocate in same field.
Box K, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S.F. 1953. Age 29, single. Military obligations completed. Employed for the past four years by a Lake States paper company. Experience includes cruising, road location, line running, photo interpretation, and scaling; also responsible for procurement of pulpwood and in charge of pulpwood landing. Will consider foreign employment.
Box L, Journal of Forestry, Mills Building, Washington 6, D. C.

June 1958, Michigan College of Mining & Technology. Single, age 23, no Military obligations. Consider all locations.
Box M, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B.S., Forest Management, 1956, Oregon State. Age 24, single. Will complete two years of active military duty as Naval Officer November 1958. Summer experience in forest research and fire control in Oregon and California. Desire position in private industry offering career opportunities. Northwestern states preferred, but other regions considered.
Box N, Journal of Forestry, Mills Building, Washington 6, D. C.

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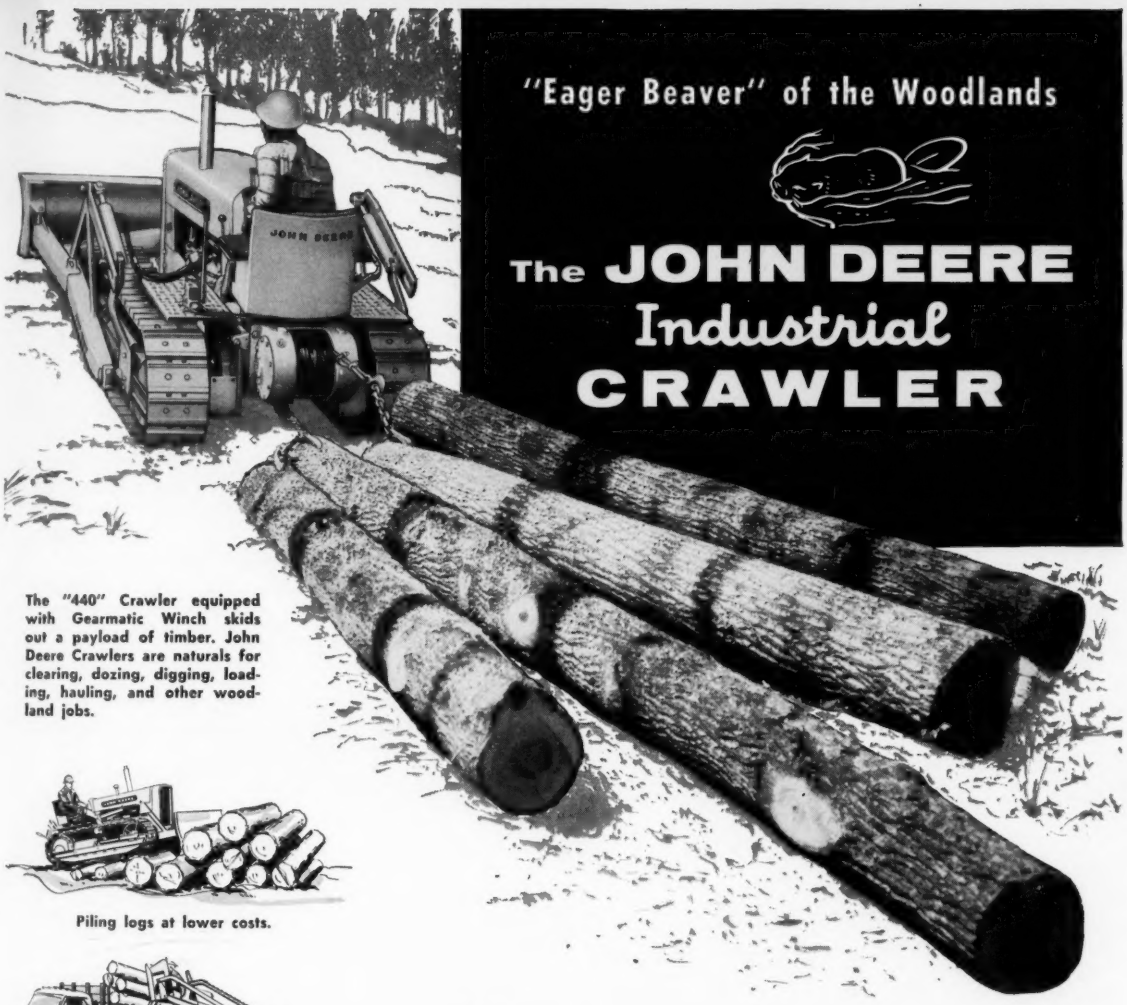

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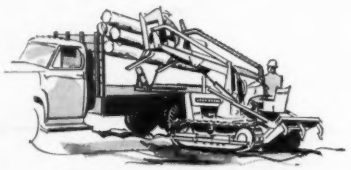

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